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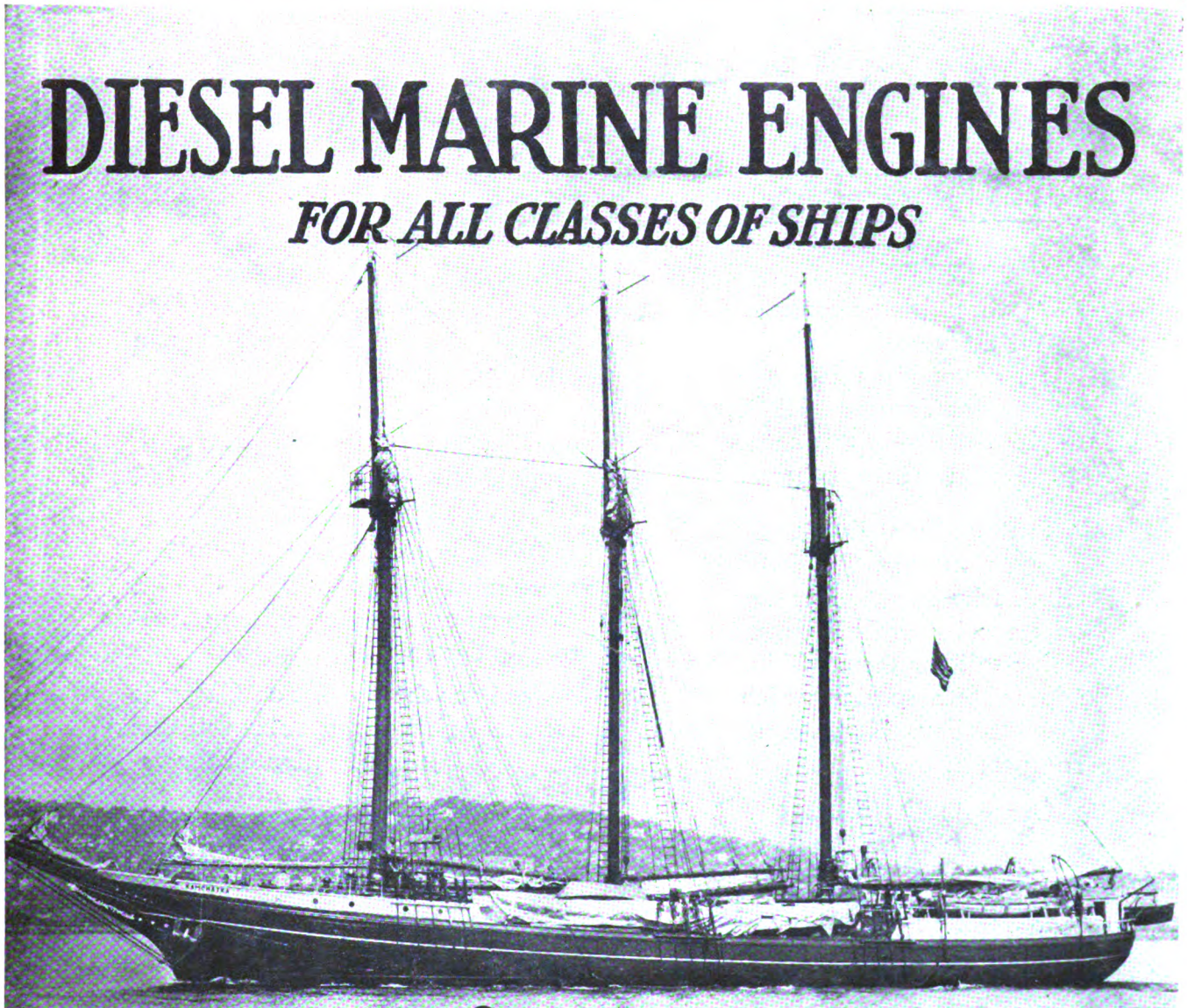
DIESEL MARINE ENGINES
FOR ALL CLASSES OF SHIPS



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EXCLUSIVE motorship-operating and technical articles by the world's foremost writers on marine engineering appear in every issue.

MOTORSHIP

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PROFUSELY illustrated with photographic reproductions of the newest designs in international merchant motorship construction.

Vol. VI | New York, U. S. A., March, 1921 | No. 3

Economical Transportation on the New York State Canal

A Series of Exhaustive Articles On Barge-Commerce Along the World's Greatest Inland Waterway

BY OUR SPECIAL COMMISSIONER

PART 1—Historical Analysis as a Key to the Present Problems of Floating Equipment.

A WATERWAY that traverses the most densely populated general area of the richest and most populous state in the Union and which links together the focus of a great nation's industry with the world's foremost seaport, is one which cannot long remain neglected in the attention of men of finance, commerce and industry, shippers, shipowners, shipbuilders, engine-makers and others connected with transportation. The New York State Barge Canal has extraordinary commercial possibilities and ranks among the greatest engineering works with which Nature has ever been harnessed by humanity.

Man has been improving on the waterways furnished him by Mother Nature ever since the Babylonians floated Barges of State from the Tigris and Euphrates to the Babylonian court and since Defoe's Robinson Crusoe attempted to launch his overweight "dug-out" by means of a trench which he led to it from the vast Ocean. George Washington was dissatisfied with the limping portages and uncertain streams over which commerce had to be carried through the only natural land-break existing between the Delaware Water Gap and the St. Lawrence valley.

Dissatisfaction is the real secret of progress, and it was not long before De Witt Clinton, additionally stirred by the signs of an exuberant commercial development, caught the infection and initiated the construction of the Erie Canal in 1817. After its completion in 1825, only a few years were needed to demonstrate its huge success. Although it was a cut of only modest dimensions, confining a water prism of 40 and 28 feet by four feet deep, it gave New York State such a boost as it has never known before or since. The villages that dotted the line of the canal blossomed out into flourishing municipalities and the population of the State went soaring.

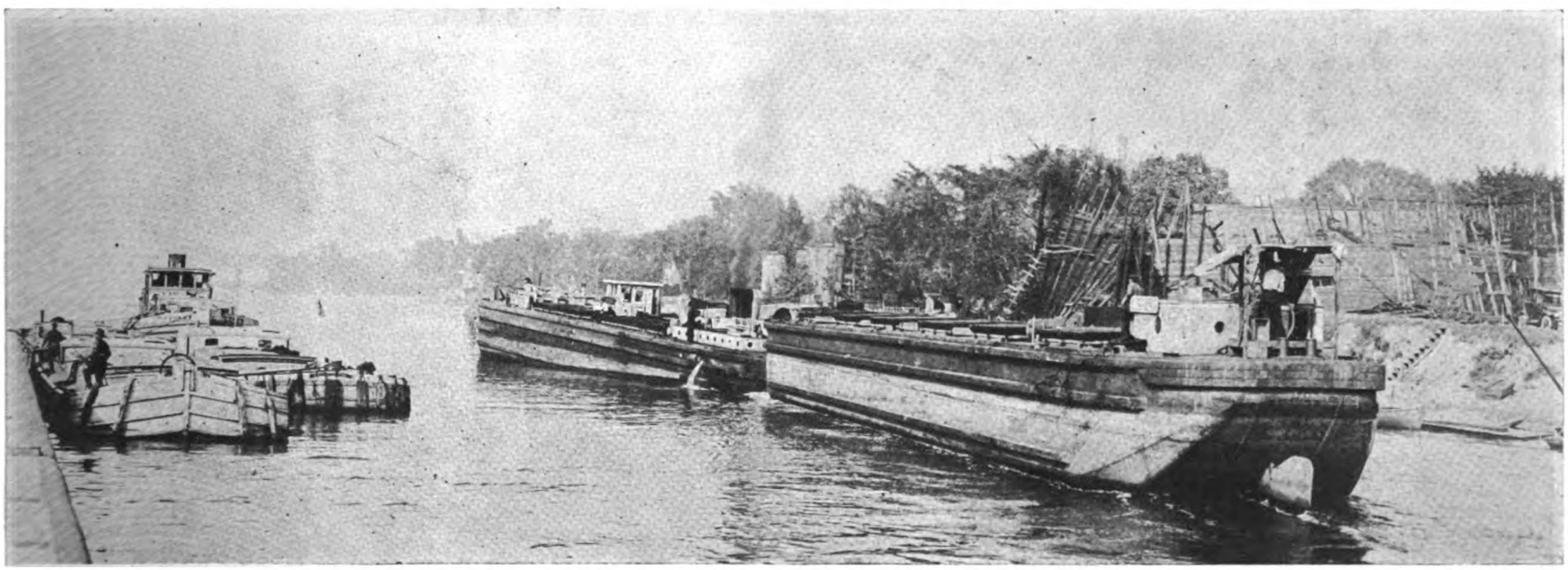
Contrary to the original conceptions of an uninterrupted waterway that was to link Buffalo and New York City, and in contrast with the most modern development in canal engineering, the original Erie Canal was build in such a way as to avoid very systematically any utilization of the natural watercourses which offered themselves between Troy and Buffalo. Even the Hudson River was utilized only as far as Albany, from which point on the canal ran parallel to the river bed instead of through it as far as Watervliet and Cohoes. At the last-named place it bent westward closely paralleling the Mohawk River as far as Rome. Turning now quite sharply southward, past New London and Oneida, it tapped Oneida Lake through a branch and passed through Syracuse at the southern tip of Lake Onondaga. After leaving the banks of the Clyde River at Lyons, the canal continued cross-country past Rochester to Tonowanda, whence it ran parallel to the Niagara River into Buffalo. The total length of this waterway was 363 miles and was served by 84 locks 15 feet wide and 90 feet long. Before any improvements or enlargements were made it had cost $7,144,000.00 and was capable of accomodating boats of 30 tons' carrying-capacity.

Practically simultaneous with the construction of the main Erie Canal, was the building of the six most important branches. The first of these was the Lake Champlain Canal, paralleling the upper reaches of the Hudson River between Troy and Whitehall, a town situated at the southern extremity of Lake Champlain and forming the key to a rich traffic in lumber from the North, marble and quarry products from Vermont, and excellent iron ore from the western shores of the lake. Two other branches, or laterals, the Chemung and the Chenango, connected up the coal and manufacturing regions which focussed at Binghamton and Elmira. A branch located in the valley of the Genesee started at Olean, joined the Erie Canal at Rochester and gave one access to Lake Ontario.

Another lateral was the Black River Canal, which led from Rome through Lyons Falls and Carthage into Lake Ontario via the river after which it is named. The remaining outlet to Ontario was the Oswego branch and joined the main canal at Syracuse. These and a number of minor cuts formed a system totaling something like 1,000 miles and carried more than 4,000,000 tons of freight in the year 1856.

EDITORIAL NOTE

With a view to developing transportation on that magnificent inland water artery of commerce—the New York State Barge Canal, "Motorship" recently appointed Julius Kuttner as its Special Commissioner to tour Canal district and make the most exhaustive study of its facilities and methods of propulsion yet undertaken by any publication. Also with a view to ascertaining the possibilities for an extensive use of crude-oil engine propelling-power to secure the greatest economy in operation of freight carriers. The first of this absorbingly interesting series of articles is herewith given and another will follow each subsequent month until all phases and problems are adequately dealt with. Mr. Kuttner is a young engineer whom we have been watching for some little time, he having occasionally contributed technical articles to our pages. His live canal articles indicate promise of a brilliant future in the marine engineering world.



Old "Western" type of Erie Canal boat at left. "Semi-Modern" steam-driv en war-time government-built craft on right. Much greater progress will attend their substitution by crude-oil engined motor-barges such as the fleet Julius Barnes recently ordered

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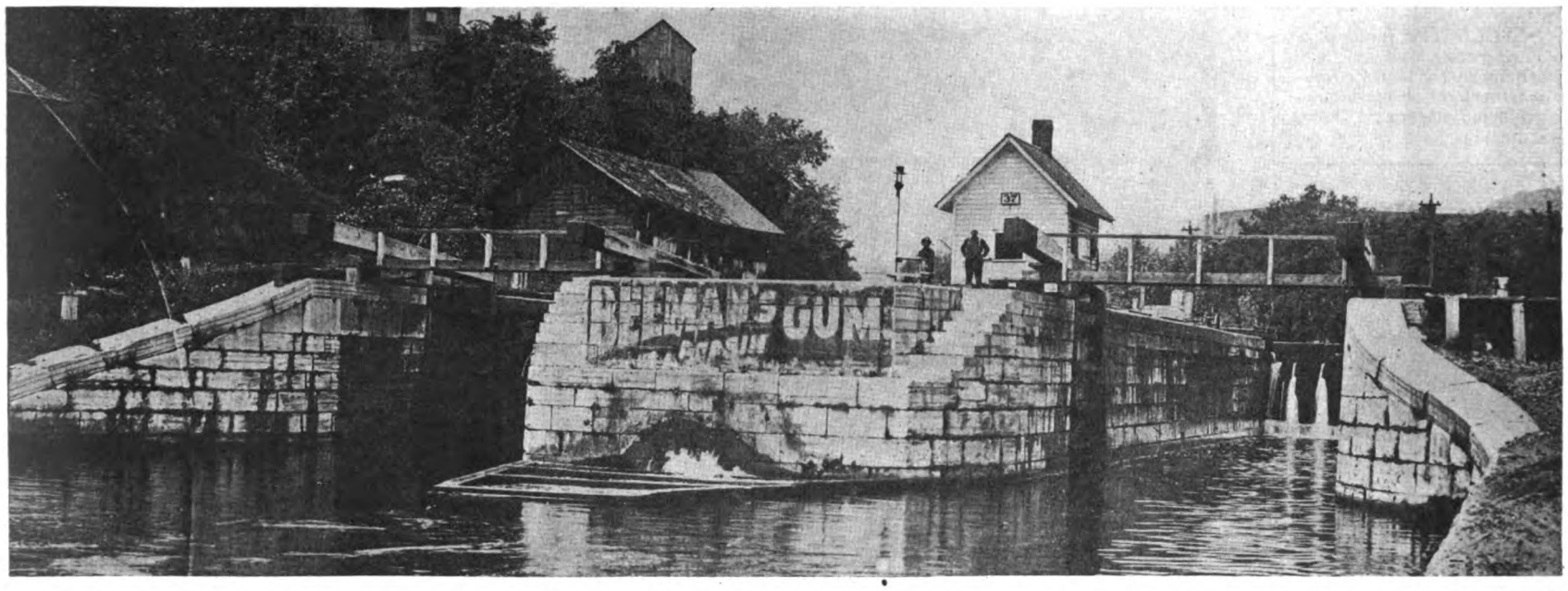


Typical view of old part of "the canal that put New York City and State on the map"—Note that even the advertisement fiend finds a use for the lock structure

to appear. It was vaguely felt that something had to be done, but the half-hearted way in which these impulses were obeyed had just the wrong effect. An increase in the size of the Champlain cut from five to seven feet depth and its widening to surface and bottom widths to 58 and 44 feet was begun but never completed, and a second and unsuccessful attempt to reach these dimensions was made in 1896. An effort to deepen the Oswego branch between Oswego and Syracuse met with a similar fate. Shippers and barge owners became reluctant to engage in enterprises as long as the State kept puttering around.

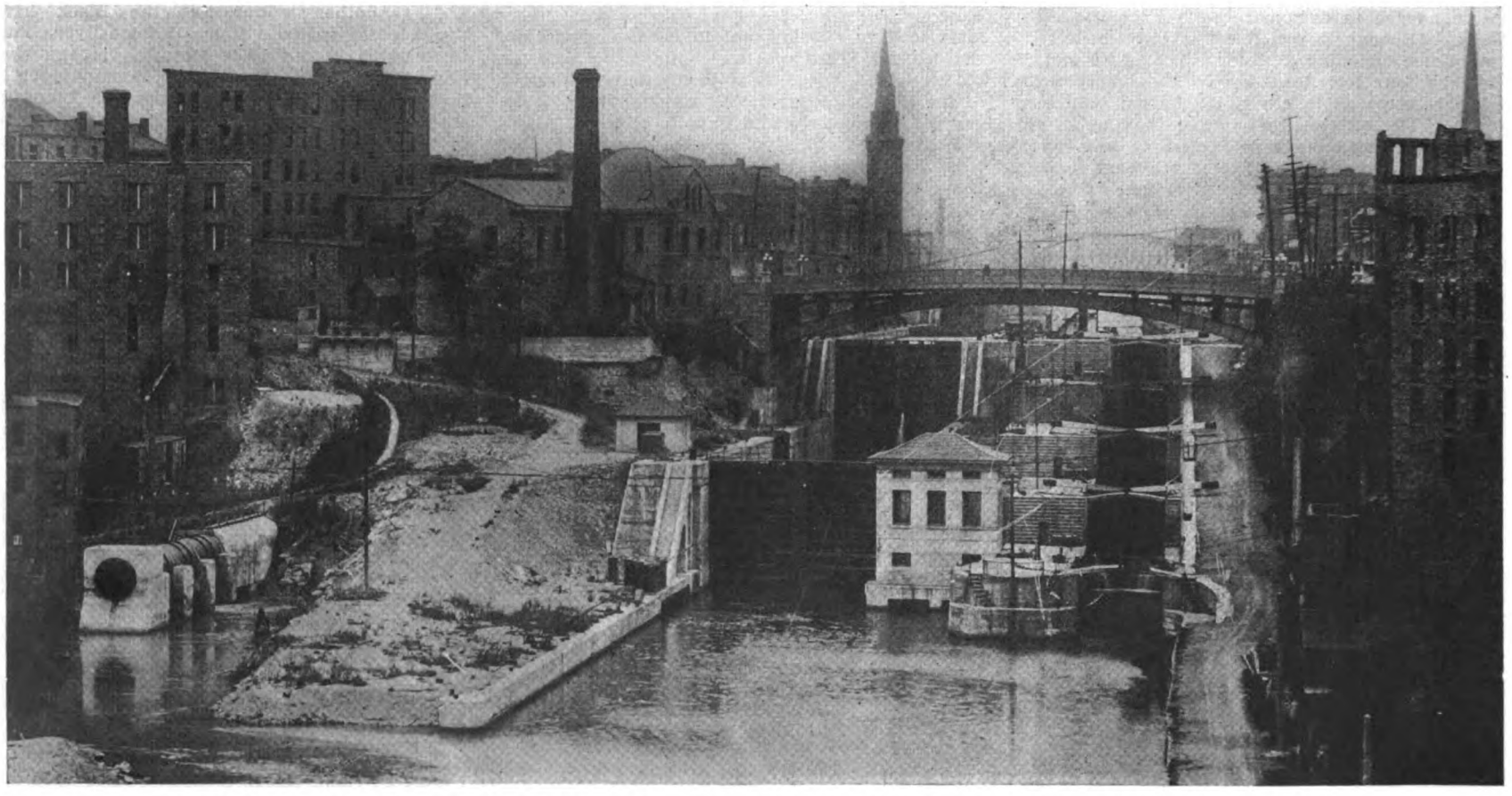
Although railroad rates never come down to the level where they could compete with the canal rates, there were other factors besides ton-mile cost which had a bearing on the movement of traffic. Even these would not have been serious had it not been for the fact that an unfounded expectation of competing rail service would make extensive canal enterprises hazardous. The inability of the fixed and rigid canal routes to gather up as a single strand the complex weave of traffic became a factor. Closure of the canals during four months of the year diverted traffic into other channels and as railroad rates continued to decline, it became increasingly difficult to force a reversion of freight movements to the canals.

The very fecundity of the growth of the communities along the canal route precluded the choice of factory and warehouse sites with reference to Canal frontage; whereas the undeniable convenience afforded by railroad spurs which were located right at the shipping platforms of factories, nay, the switching of cars into the actual factory buildings, afforded a type of service which no canal systems could give. While the suburbs of cities began to bristle with smoke-stacks and railroad spurs, the shiny surface of the canal continued to wind its way ever more placidly under railroad bridges and over the countryside.

Although the failure of craft and motive power which has been indicated may be considered as the effect of the conditions just described, they were also a cause of them and as such they require consideration. Until the end of the prosperous period of the original canal, new barges for replacement of old were generally increased in size to take advantage of larger canal sections and bigger locks whenever the State made such improvements.

From about 1880 on, however, when traffic began to decline, no progress whatever was made in the design of canal boats, no matter what the canal did. The type crystallized at about that time into the long familiar "Erie Canal Boat," a craft which today constitutes the biggest part of the floating equipment of the canals. These barges were 98 feet long, had a beam of 17½ feet and depths varying between 9 and 11 feet. Their carrying-capacity was 240 tons, based on wheat. Their section was, of course rectangular, and the question of its most economical proportioning in relation of the then existing canal sections had been scientifically considered from the point of view of towing resistance and most economical speed. In the stern of this type of boat were accommodations for a crew of one man and family and ample hatches gave commodious access to the cargo space.

Some of them, known as the "Western" type, were built with a pronounced upward flare of the upper bow structure, the purpose of which was to prevent spare mules that were sometimes carried from walking overboard. Needless to say, they were obsolete already in 1890, but they were better than nothing. A former State Superin-



Tandem locks at Lockport, N. Y., illustrating the great advance in civil engineering phases of Canal Transportation

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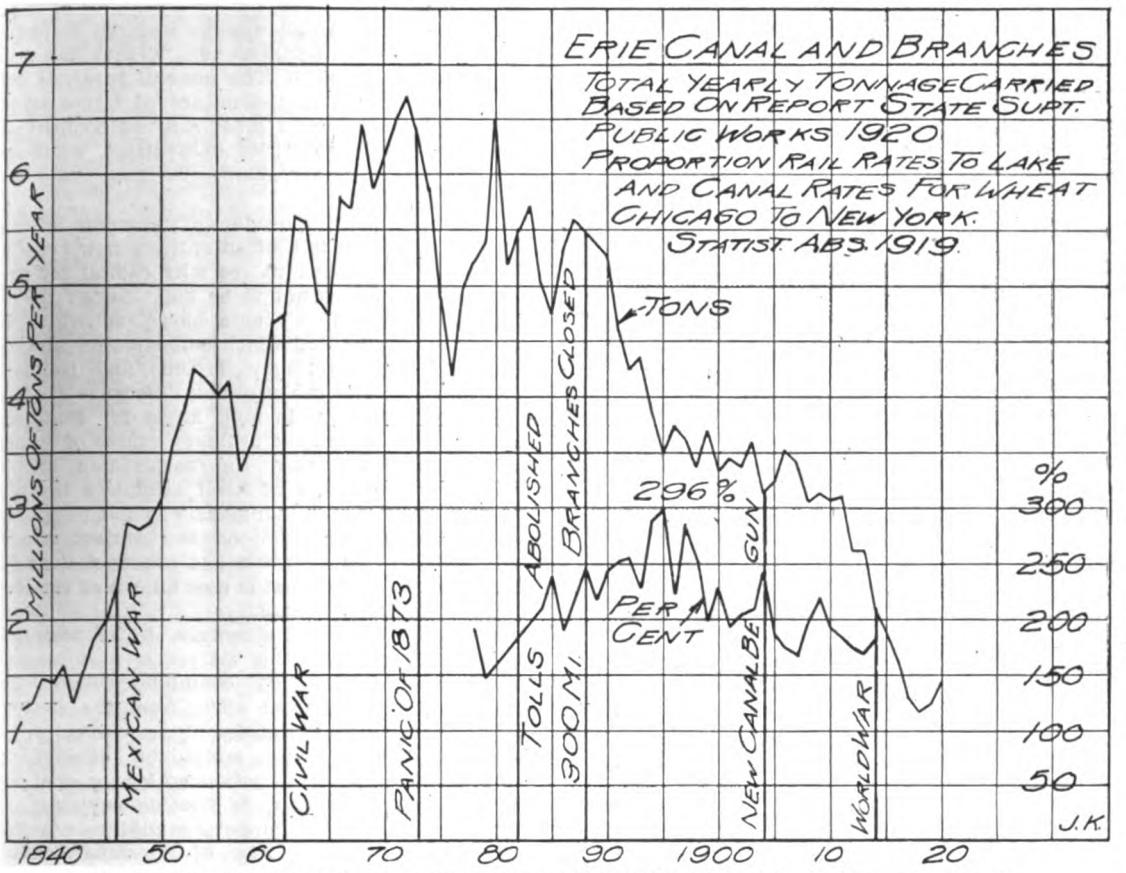


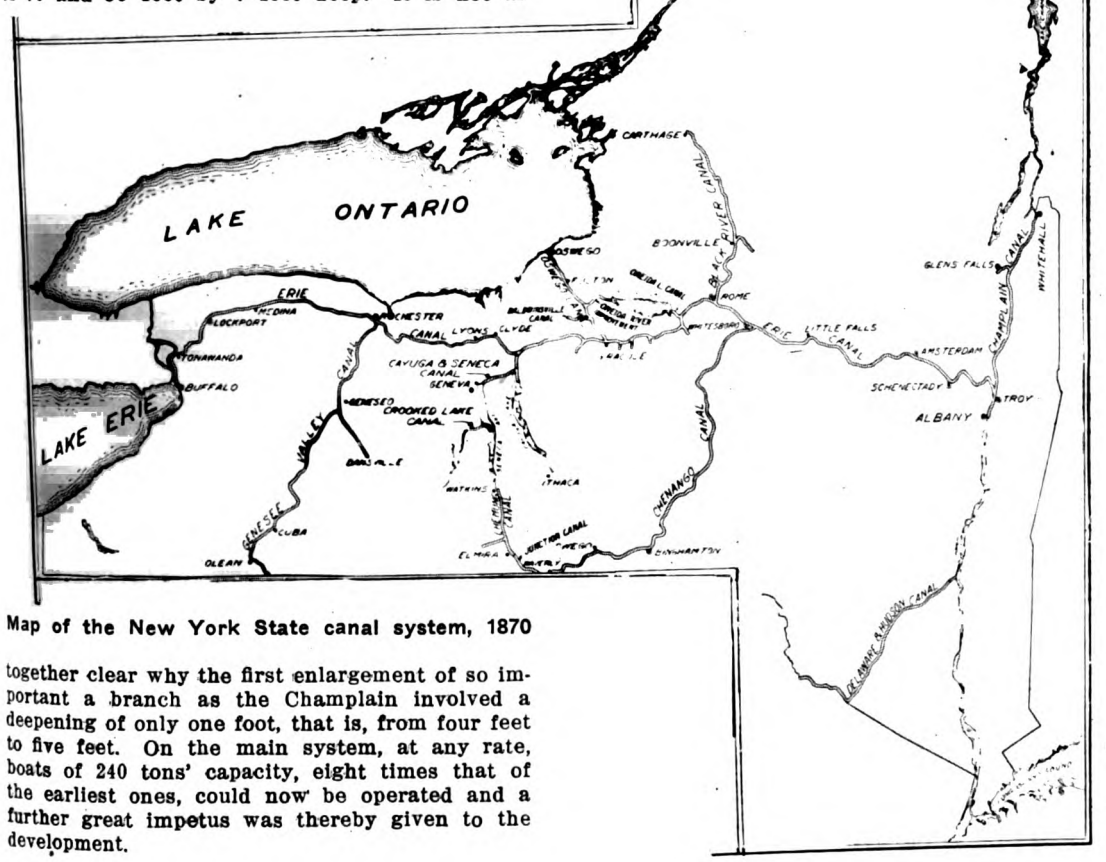
Illustrating rise and fall of canal traffic and indicating that the decline was due to causes other than railroad rate competition

The very aspect of the cities which owe their growth to the canals has been determined by their courses and the general nature of their commerce even to-day shows how deep "Clinton's Ditch" was really dug. The lines of the streets and the location of the business and industrial centers are in many instances related to the artificial waterways. Some idea of the influence which the canal had on the minds of the cities' inhabitants may be had by considering that many of the city seals and insignia bear representations of the canal, of the craft used on it, and of the old freight terminals.

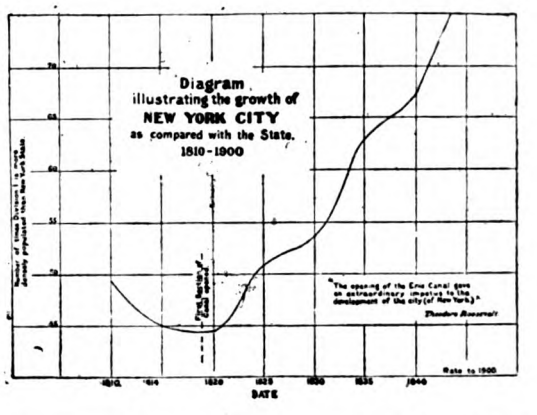
In view of the powerful influence thus exerted even by the original and diminutive canal, it is not at all surprising that enlargements and additions were called for and carried out within a very few years. The most important one of these works covered the period between 1835 and resulted in enlarging the major members of the canal system to a prism having a water section of 70 and 56 feet by 7 feet deep. It is not altogether clear why the first enlargement of so important a branch as the Champlain involved a deepening of only one foot, that is, from four feet to five feet. On the main system, at any rate, boats of 240 tons' capacity, eight times that of the earliest ones, could now be operated and a further great impetus was thereby given to the development.

Strange as it may seem, the steam boat, whether tug or freighter, did not make its appearance until 1875, fifty years after the first opening of the canals. The original boats had runways on them for poling by man-power and it is astonishing that the excellent showing should have been made in the face of handicaps like that. For many succeeding decades towing by mules who walked on tow-paths specially provided along the banks of the canals was the only motive power in spite of Fulton's invention at the beginning of the century.

In our own day, this lack of progressiveness is curiously matched by the stubborn retention of the non-condensing steam tug and power barge, notwithstanding enormous rewards that are held out by even the most modest application of the modern economical oil-engine. It is a safe estimate that the internal-combustion engine of to-day with its astonishingly low consumption of cheap heavy mineral-oils and common town gas-works tar-oils fuels will do for the canals what the substitution of steam for mules has done in years gone by. Then as now, floating equipment was a step-child in the minds of the canal builders and of the millions that were freely spent for excavation and lock construction, hardly a tithe went for boat or engine building.



Map of the New York State canal system, 1870



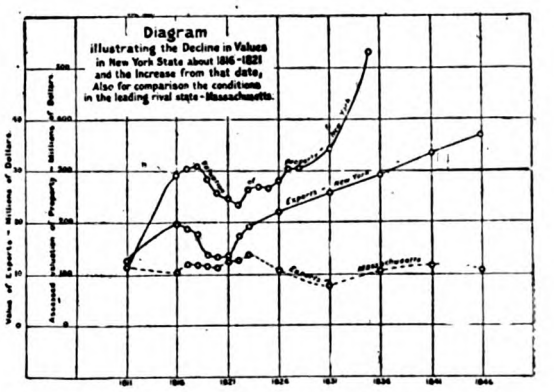


Diagram
illustrating the Decline in Values
in New York State about 1816-1821
and the Increase from that date.
Also for comparison the conditions
in the leading rival state - Massachusetts.
Value of Exports - Millions of Dollars
Assessed Valuation of Property - Millions of Dollars
Exports - New York
Massachusetts

out of the running. In very truth, the canal system had put New York State and City "on the map."

Almost at the high-water mark of the Canal's success, there began to manifest itself a tendency of abandoning the less important branches, a phenomenon of significance not only because it showed the beginning of the railroads' effect on the canal system, but also because it presaged the present low peak of the canals' local and interurban transportation. During the years 1877 and 1878 the Chemung, Chenango, Genesee Valley and minor branches totaling about 300 miles were closed to navigation and instead of floating the rich traffic which had been prophesied for them, continued exclusively as the "abode of frog and water-fowl." They had at no time been successful; during their last years the best yearly tonnage of the Chemung branch did not exceed 215,000 tons, the Chenango carried less than 34,000 tons, and the Genesee Valley less than 80,000.

These southern branches, like a good many wild-cat railroad lines, owed their existence to the general canal-building mania which attended the spectacular success of the original Erie. Far from being the fulfilled dreams of a Washington or a Clinton, they came into being because they gave some lesser statesmen the only opportunity they might ever have of sharing in the glory of the Canal System.

Although the main artery was at this time (1875 to 1880) still in its strongest pulse, additional signs of its weakening and decline began

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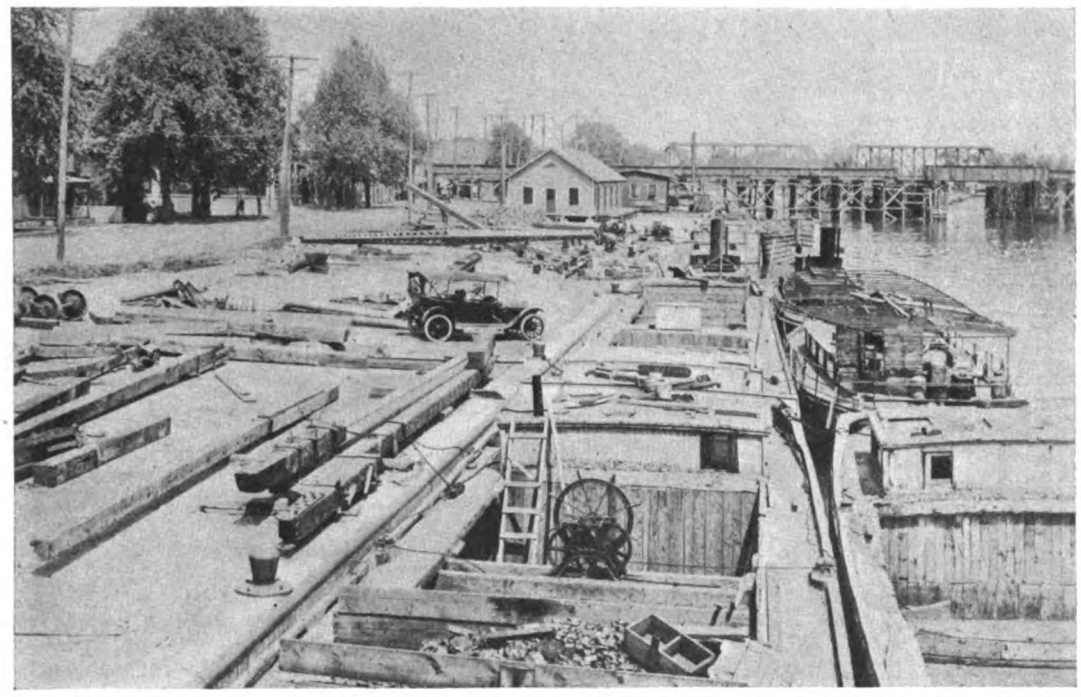

Miscellaneous Assortment of "tubs" that were out of date in 1890. Seven hundred of these still remain on the canal. If not a menace to navigation, they are at least an obstacle to progress

tendent of Public Works, Mr. C. S. Boyd, in his report for 1902 laments their growing extinction as follows:

"It is hardly necessary to again refer to the direct bearing on canal tonnage of the abandonment of old boats and the failure to replace them with new. A very large number of boats at present in commission on the canals have been in use continuously for many years. Many of these boats go out of commission only when they are so dilapidated that insurance companies no longer accept them as risks. I believe it cannot be expected that any large number of boats intended for canal traffic will be constructed until the State policy with respect to future treatment of her waterways has been defined. It is a fair estimate to say that for every new boat constructed during the last six years ten boats have been abandoned. With this condition existing and bound to continue, even the most enthusiastic canal men, it would seem to me, have little ground for hoping to see any great revival in canal interests as reflected in tonnage shipments."

The excessive pessimism of this statement conceals within itself a bright promise for the future of canal traffic, because it strengthens the evidence already considered, to the effect that the decline of canal traffic was due to a variety of circumstances, among which competing rates per ton-mile were only a secondary and contributory factor. As a matter of fact, railroad rates have to this day failed to come even within competing range of canal rates, as an examination of the appended curves will show. For reasons of a different nature, the railroads have cooked the old canals' goose as far as way-traffic is concerned, but they never were and never will be able to destroy the availability for canal traffic of immense bulk through shipments. Such might have consisted of flour, grain lumber, pig-iron, and foundry and building materials. Their very nature makes them a far more suitable subject for canal transportation than for rail shipments.

With a little aggressiveness and determination and the use of up-to-date equipment, canal carriers might have re-organized their service for the through bulk traffic and snapped their fingers at the railroads. Such a course would have been too much to have been expected of a host of small barge owners who had glorious memories to live on, but who had never had a chance for acquiring a broad business outlook. As will become apparent later, the lessons of this bit of history have a pointed bearing on the situation of to-day and there is a good prospect of their being heeded.

Railroad competition on the basis of rates, then, was not a very real factor in the decline of the canals, and freight handling seems to have been the decisive element. A third method of competition, namely, undercutting in specific cases with the intent to ruin small canal carriers, was also probably resorted to. It has a little or no bearing on the canal business of to-day.

Confronted with a chaotic situation and having an insufficiency of even third-rate equipment to meet it, there is small wonder why the people of New York State began to ask "What's the matter with the Canal?" The general paralysis due to uncertainty as to the nature of future traffic and to the inability to meet railroad competition with the inferior facilities immediately available, hit hardest at undertakings for new boats and tugs.

As the result of sporadic enlargements left unfinished and with talk of an entirely new canal in the air, it isn't hard to see why capital for new types of boats was not to be had. Surely the individual owner of a single barge, on which he reared his family and which embodied for him the sum total of hearth, home, fortune, and livelihood was no match for the situation. Because of these many dilemmas, a demand arose for State improvements, and, in the ordinary course of events, barring a world war, the assumption that a modern canal would of itself stimulate the production of suitable equipment was not altogether unreasonable. Agitation on the subject culminated in 1903 in legislation and appropriations for the construction of what is now known as the New York State Barge Canal.

This newly erected structure, to be portrayed in a continuation of this article, is a stupendous engineering work, fully complete, refined, and settled, a very different affair from the doubtful ditch of 1880. Uncertainties of a technical or engineering nature that might be affected by changes in canal construction no longer exist and it is up to the builders of floating equipment to take the initiative. Shippers cannot be expected to take the lead in view of the miscellaneous tubs and junk that form the greater part of the transportation facilities now offered to them. At the risk of getting a little ahead of the story, attention is here called to the extraordinary suitability of internal combustion-engine propulsion for barge canal work. With a power cost of only a few per cent of that of the present wasteful propulsion means, reduction in labor costs, elimination of heavy stand-by losses, residual-oil engine-builders have a proposition to offer for which no competition is even in sight.

JULIUS KUTTNER

(To be continued in April issue of "Motorship")

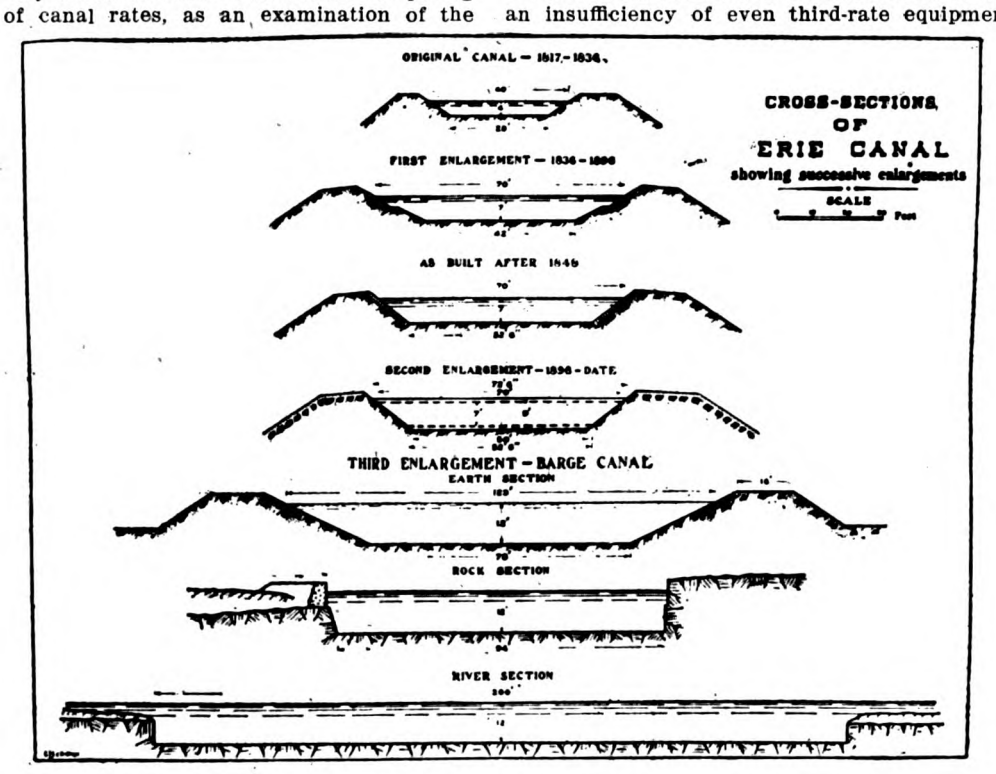

Plate No. III.

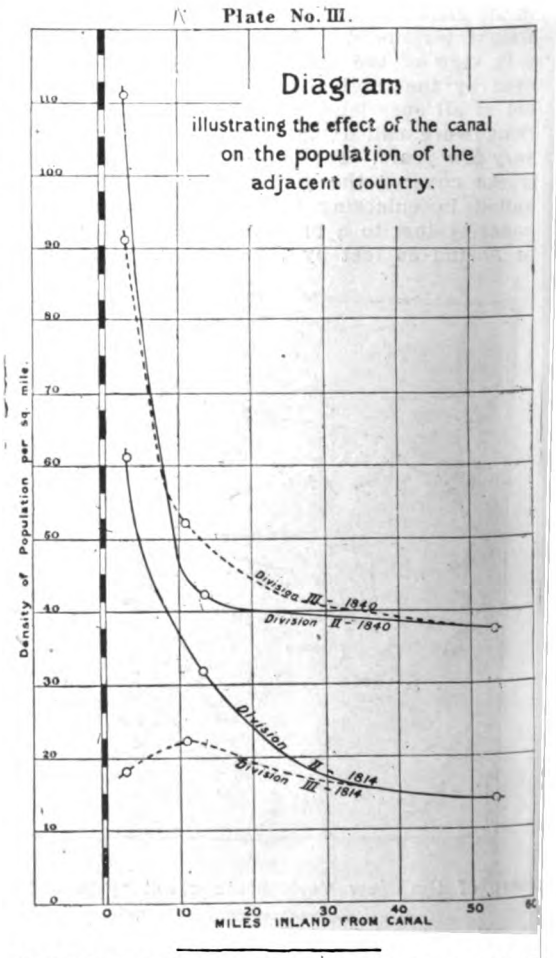
Diagram
illustrating the effect of the canal on the population of the adjacent country.
Density of Population per sq. mile.
MILES INLAND FROM CANAL
Division III – 1840
Division II – 1840
Division II – 1814
Division III – 1814

ANOTHER GERMAN WARSHIP WILL SOON BE MOTORSHIP

"Odin," a German coast-defense battleship of 4,100 tons displacement built in 1894, is being reconstructed and converted into a Diesel motorship.

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First Diesel-Electric Cargo-Ship Installation in America

Conversion of the "Fordonian" by the Todd Shipyards Corporation — First Ansaldo-San Giorgio Diesel-Engine Installation in America

SINCE penning the Editorial in this issue entitled "Solution of America's Serious Shipping Problems" in which we urge conversion of existing uneconomical steamers to oil-engine power and propose Federal subsidies for such work, news has reached us that the Todd Shipyards Corporation of New York has received an order from the American Mediterranean Steamship Co. (McDonnell & Truda, New York representatives) to convert the single-screw ship "Fordonian" to Diesel-electric propelling power, and indications show that many more vessels soon will be converted to Diesel or Diesel-electric power.

This vessel was originally built in England for Canadian owners in 1912 for service on the Great Lakes and was afterwards sold to the United States. Her dimensions are as follows:

Deadweight-capacity	2,200 tons
Power	750 shaft h.p.
Length	257 ft.
Breadth	42 ft., 6 in.
Depth	26 ft., 6 in.

The new machinery is to consist of twin Ansaldo-San Giorgio two-cycle type four-cylinder Diesel engines, each of 425 b.h.p. coupled to two 340 K.W. 250 volt compound-wound General Electric generators turning at 200 R. P. M. which will furnish current to an 850 brake h.p. electric-motor coupled direct to the propeller-shaft. All the machinery will be installed aft in the present engine-room. The Diesel-engines have been built in Italy, and are now en route to this country. Contract for the conversional work has been placed with the Todds Shipyards Corporation.

Simultaneously, the same company—or rather its subsidiary the Tebo Yacht Basin—received an order from the U. S. Shipping Board to convert the 11,800 tons steamship "Archer" into a turbine-electric ship. It would be interesting to know why, and who is responsible in the Shipping Board for the ignoring of Diesel-electric power in the conversion of the "Archer," as the latter system is far more economical than turbine-electric drive. If consumption economies of the two systems are compared the turbine-electric drive hasn't a look in. No wonder how much longer the officials of the Board, will be allowed to continue wasting the Country's money in this manner, when hundreds of other American steamers are already tied-up. We suggest that Admiral Benson investigate the matter.

To return to the "Fordonian," the following new auxiliary equipment will be installed—

Auxiliaries

One 5 K. W. motor generator-set, 125-volts for lighting.

One complete control-equipment, arranged for engine-room operation only.

One Motor-driven blower for ventilating main-motor.

The following auxiliaries will be furnished and installed by contractor:

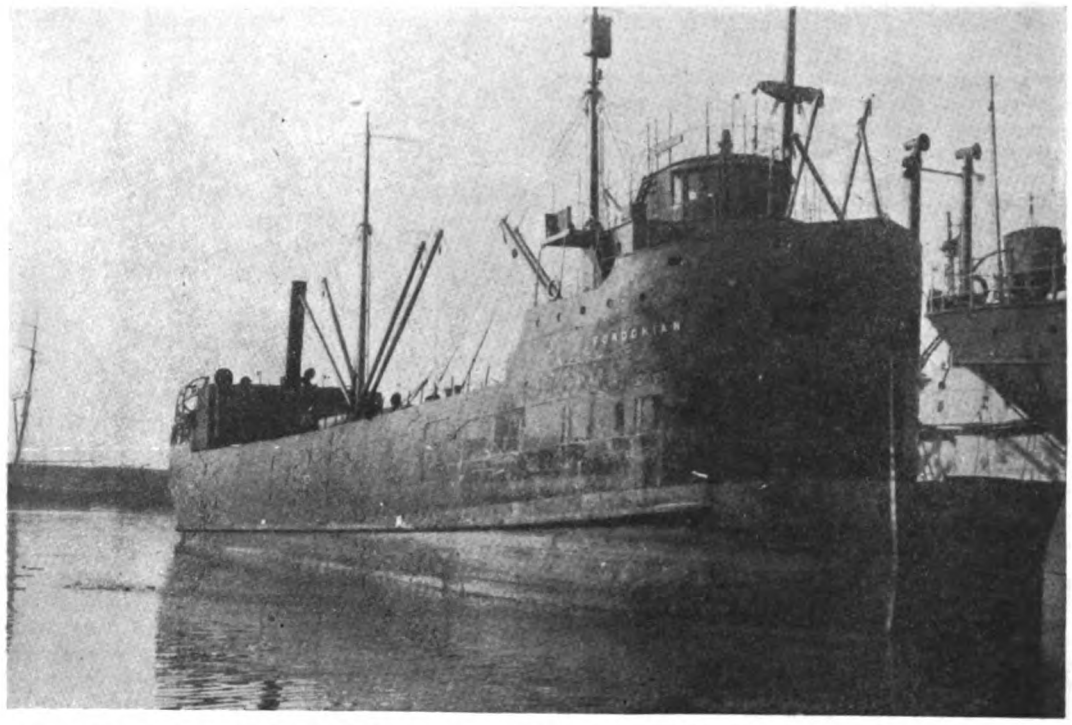
One circulating-pump, 400 gallons per minute, driven by 10 H.P. electric motor—Rumsey figure 1120.

One 5 in. x 8 in. vertical triplex single active fuel-oil pump, driven by 5 H.P. motor—Rumsey figure 692.

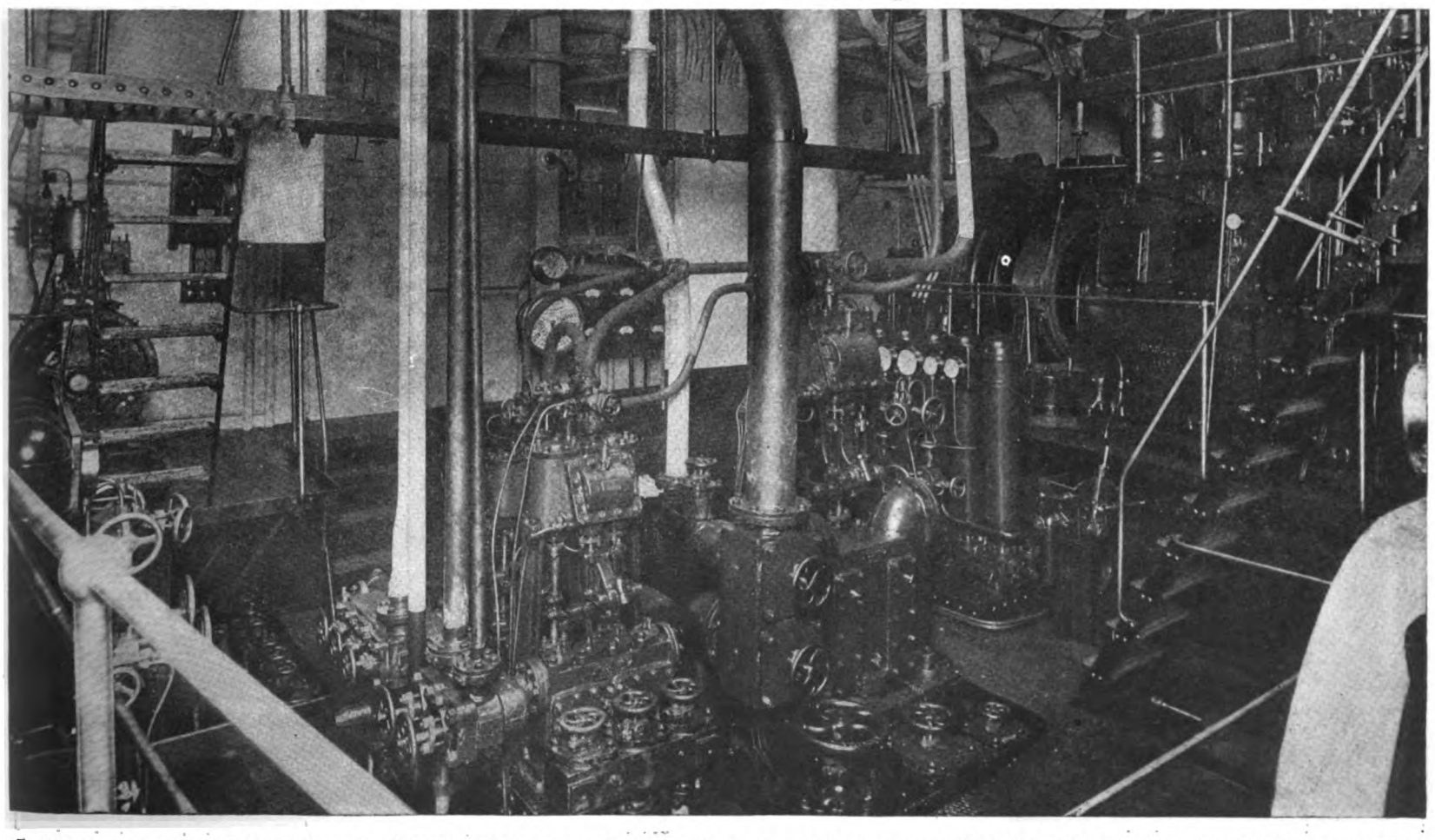
One 6 in. x 8 in. vertical Rumsey triplex single-active fire-pump, driven by 10 H.P. motor.

One 25 H.P. Meitz vertical single-cylinder hot-bulb oil-engine direct-connected to 15 K.W. generator, 250 volts, direct-current.

One 9 H.P. Meitz vertical single-cylinder hot-bulb oil-engine direct-connected to 6 K. W. generator, 125 volts, direct-current.



The freighter "Fordonian" being converted to Diesel-electric drive by the Todd Shipyards Corp.



Engine-room of a British freighter with Diesel-electric drive. On the right is one of the two main 300 b.h.p. Diesel-engines coupled to a generator

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Service of a Wooden Motorship—Extraordinary Figures for Shipowners' Digestion

Sixty-Three Thousand Miles in the Pacific Run by Seven-Knot 2,000 Tons D.W. Vessel in 2½ Years—An Average of 65 Miles per Ton of Fuel-Oil Burned

IT certainly seems extraordinary that, although all the steam-driven wooden motorships America built during the war have proved commercial failures, and most of them hopeless as ocean-going craft, yet every full-powered Diesel-driven wooden motorship constructed at the same time has proved most seaworthy and commercially successfully in every respect. At the time the big wooden fleet was projected, one of our leading naval-architects told the Senate Investigating Committee that if Diesel-engines were installed in these craft we would not be able to operate them after they were built, and that he would not recommend internal-combustion engines for wooden hulls to the Emergency Fleet Corporation, because they had never been demonstrated for overseas work. (See "Motorship" March, 1918, page 3.)

Since this naval-architect made these statements over a dozen full-powered Diesel-driven wooden motorships have been placed in service by private owners on the Pacific coast and without a single exception have put up surprising performances as to seaworthiness, reliability and economy in operation, forming a strange contrast to the pitiful fiasco made by the Government's wooden coal-burning steamers built and powered in accordance with the plans of the naval-architect in question. Among these successful wooden Diesel-ships we will mention the "Libby Maine," "Cullbura," "Babinda," "Donna Lee," "Cethana," "Balcatta," "Trolltind," "Benowa," "Semiltind," "Borrika," "James Timpson," "Isle de Java," "Coolcha," "Boobyalla," etc., which are vessels of 2,000 to 4,000 tons d.w.c. We do not refer to many of the large ridiculously under-powered wooden motor auxiliaries, some of which were equipped with experimental oil-engines of other types, as most of these installations were practically condemned by "Motorship" before they were launched.

One of the earliest of these wooden motorships was the "full-powered" freighter "Libby Maine," whose only "defect" is that to our mind she has insufficient power and speed for her size, but in the face of this little deterrent has done splendidly. She is a twin-screw ship of 2,000 tons deadweight capacity, powered by twin Dow Diesel-engines of 320 shaft h.p. each (428 i.h.p.), whereas she should have had at least 1,000 shaft h.p. total or 500 h.p. per shaft. Her trial speed averaged 7 knots. Since that trip she has covered a total of 63,185 nautical-miles at an average speed of 6.72 knots. Under the circumstances this is a most remarkable performance, probably never equalled by any wooden steamer of her size and power.

She was placed in service in June, 1918, by her owners, Libby, McNeil & Libby of Chicago, and is 240 ft. long with 43 ft. breadth and 24 ft. moulded depth, her twin engines turning at 240 r.p.m. but driving the propellers at 100 r.p.m. through Falk reduction-gears.

We are enabled to give a complete record of her voyages, and a chart showing the various routes. An analysis of these voyages reveal some most extraordinary figures, that will bear the closest comparison with the very best of steel steamers of the same size and power.

Altogether she has successfully made 14 voyages aggregating 63,185 nautical miles at an average speed of 6.72 knots, using but a total of 966 tons of fuel-oil, or an average distance of 65 nautical-miles run per ton of fuel-consumption.

The following is a summary of the results of the 14 voyages:

A successful American wooden ship—the "Libby Maine"

Period of operation	2 years, 7 months
Total mileage run	63,185 naut. miles
Time at sea	9,339.9 hours
Average speed maintained	6.72 knots
Total fuel-oil consumed	6,764 bbls. (966 tons)
Distance per bbl. of fuel	9.36 naut. miles
Distance per ton of fuel	65 naut. miles
Daily fuel-consumption	17.37 bbls. (2.48 tons)
Average engine-speed	238.21 r.p.m.
Average propeller speed	About 92 r.p.m.

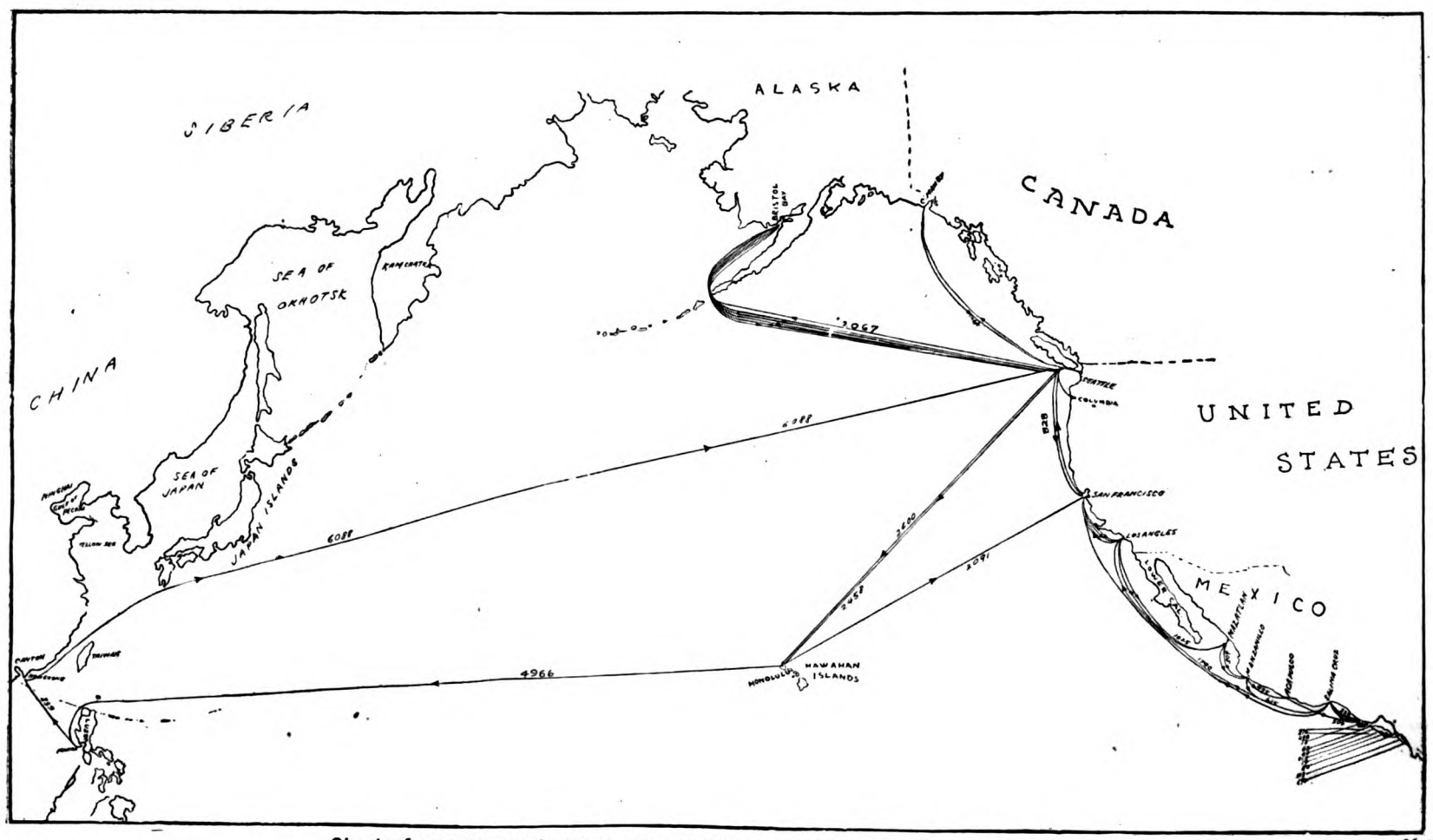

Chart of voyages made by the Diesel-driven wooden motorship "Libby Maine"

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VOYAGES OF DIESEL-DRIVEN WOODEN MOTORSHIP "LIBBY MAINE"
ABSTRACTS OF LOGS
(See Page 206)

Voyages	Voy. No.	Naut. Miles	Time Hrs.	Aver. Knots	Fuel Total No. Bbls.	Naut. Miles Per Bbl.	Bbls. Per Day	R.P.M.
Portland-Seattle	1	389	60	6 48	....	....	....	220
June 23, 1918								
Seattle-Alaska		2067	309.5	6.90	209.6	10.4	16.25	....
Alaska-Seattle		2067	291.5	7.3	244.4	8.75	20.5	....
Seattle-Honolulu	2	2400	354.25	6.88	259.5	9.25	17.6	237.75
Honolulu-San Francisco		2091	357.3	5.77	305.	6.85	20.4	237.33
San Francisco-Seattle		828	141.4	6.0	103.4	8.01	17.5	....
Seattle-Honolulu	3	2458	362.3	6.0	255.	9.63	16.9	236.3
Honolulu-Manila		4966	688.7	7.21	468.	10.60	16.36	239.09
Manila-Hongkong		658	87.7	7.72	63.	10.61	17.26	236.0
Hongkong-Seattle		6088	860.	7.08	663.4	9.17	18.51	238.6
Seattle-Koggiong	4	2090	348.5	5.99	268.5	7.79	18.46	236.5
Koggiong-Seattle		2051	257.6	7.97	192.	10.67	17.92	239.4
Seattle-Koggiong	5	2058	331.2	6.22	237.	8.67	17.17	....
Keggiong-Seattle		2035	286.8	7.10	236.5	8.60	19.75	....
Seattle-Yakutat	6	1064	150.6	7.07	100.	10.64	15 95	....
Yakutat-Seattle		1038	135.5	7.65	95.5	10.85	16.92	....
Seattle-San Francisco	7	....	....	....	....	....	....	....
San Francisco-San Pedro		....	....	....	....	....	....	....
San Pedro-Mazatlan		....	....	....	....	....	....	....
Mazatlan-Manzanillo		....	....	....	....	....	....	....
Manzanillo-Salina Cruz		....	....	....	....	....	....	....
Salina Cruz-Champerico		....	....	....	....	....	....	....
Champerico-San Jose		....	....	....	....	....	....	....
San Jose-Acajutla		....	....	....	....	....	....	....
Acajutla-La Libertad		....	....	....	....	....	....	....
La Libertad-Amapala		....	....	....	....	....	....	....
Amapala-La Union		....	....	....	....	....	....	....
La Union-Corinto		3826	532.8	7.22	387.3	9.88	17.43	239.2
Corinto-San Jose		....	....	....	....	....	....	....
San Jose-Champerlco		....	....	....	....	....	....	....
Champerico-Salina Cruz		....	....	....	....	....	....	....
Salina Cruz-San Francisco		2695	388.25	6.94	284.5	9.47	17.59	240.8
San Francisco-San Pedro	8	....	....	....	....	....	....	....
San Pedro-Mazatlan		....	....	....	....	....	....	....
MazatlanManzanillo		....	....	....	....	....	....	....
Manzanillo-Acapulco		....	....	....	....	....	....	....
Acapulco-Champerico		....	....	....	....	....	....	....
Champerico-San Jose		....	....	....	....	....	....	....
San Jose-Acajutla		....	....	....	....	....	....	....
Acajutla-La Libertad		....	....	....	....	....	....	....
La Libertad-Amapala		....	....	....	....	....	....	....
Amapala-Corinto		....	....	....	....	....	....	....
Corinto-San Juan del Sur		3046	412.1	7.39	278.15	10.94	16.21	240.85
San Juan del Sur-La Union		....	....	....	....	....	....	....
La Union-San Jose		....	....	....	....	....	....	....
San Jose-La Union		....	....	....	....	....	....	....
La Union-Champerico		....	....	....	....	....	....	....
Champerico-Salina Cruz		....	....	....	....	....	....	....
Salina Cruz-San Pedro		....	....	....	....	....	....	....
San Pedro-San Francisco		3275	493.2	6.64	340.	9.63	16.54	239.87
March 8th, 1920								
San Francisco-Seattle		818	181.6	4.82	141.4	5.8	18.7	232.5
Seattle-Yakutat	9	1011	155.7	6.48	115.4	8.77	17.7	240.
Yakutat-Seattle		999	132.3	7.55	89.2	11.2	16.12	241.
Seattle-Koggiung	10	2063	338.	6.1	242.7	8.5	17.22	238.3
Koggiung-Seattle		2078	303.	6.85	210.7	9.9	16.68	239.7
Seattle-Kanai	11	1357	221.6	6.12	161.8	8.3	17.5	239.5
Kanai-Seattle		1417	207.5	6.82	144.1	9.7	16.74	241.3
Seattle-aYkutat	12	1035	141.5	7.31	98.9	10.5	16 7	240.8
Yakutat-Seattle		1045	168.2	6.19	117.1	8.9	16.6	239.5
Seattle-Taku	13	885	126.5	6.99	84.	10.5	15.18	240.7
Taku-Seattle		903	129.3	6.98	94.2	9.6	17.4	241.1
Seattle-San Pedro	14	1202	206.	5.83	148.	8.1	17.2	238.4
San Pedro-San Francisco		1182	179.5	6.5	126.3	9.35	16.8	239.2
TOTAL AVERAGE		63,185	9,339.9	6.72	6,764.6	9.36	17.37	238.21

THE HOWALDSWERKE MOTORSHIP

"Vistula" is the name of the 8,800 tons d.w.c. Sulzer Diesel-engined motorship building at the Howaldswerke, Kiel, Germany.

INSURANCE OF MOTORSHIPS

We understand that the Pierce Navigation Co. of New York has insured their steel Bolinder-engined motor-tanker "Pennant" for $860,000 at 5½%, this representing half the vessel's value.

TRIALS OF MOTORSHIP "SCANIA"

On her trials the Swedish Lloyds new small motorship "Scania" (already described and illustrated in "Motorship") attained a speed of 10 knots. She is propelled by twin 500 shaft h.p. Polar Diesel engines.

MOTORSHIP "KIRKTIND" CHANGES HANDS

The Donovan Lumber Company of San Francisco has purchased the wooden motorship "Kirktind," 2,205 tons gross, for $153,000.00. This vessel is propelled by twin 450 b.h.p. Winton Diesel engines and will be used on the coastwise service between Aberdeen, Washington and San Pedro, Calif.

TWO MOTORSHIPS FOR REDERI STJARNAN

Two motorships of 1,150 tons d.w.c. and 1,200 tons d.w.c. are being built for the Rederiaktiebolaget Stjärnan of Karlsted by the Bergsunds Motorfabrik of Stockholm, Sweden. Bergsunds surface-ignition oil-engines are being installed.

SOCIETA TRANSATLANTICA ITALIANA'S MOTOR-LINERS

The three passenger motorships building for the Societa Transatlantica Italiana, of Genoa, at Ansaldo San Giorgio, Ltd.'s, yard will carry 350 first and second class passengers and 5,800 tons of cargo. Twin 2,000 shaft h.p. Ansaldo San Giorgio two-cycle type Diesel-engines are to be fitted, and a speed of 13 knots attained. The crew will consist of 149 men of whom 16 will form the engine-room staff.

GROWTH OF SWEDISH MOTORSHIP FLEET

It is of particular interest to note the gradual change in Sweden from steam to motor-driven vessels says "Fairplay," and this feature seems to have received considerably stronger accentuation during the last year. At the end of 1914 the number of motor-vessels in the Swedish mercantile fleet amounted to 4.7 per cent. of the whole fleet, with a gross register capacity of 2.2 per cent. The corresponding figures at the end of last year were 18.4 and 10.7 per cent.

SUBMARINE ENGINES ON SAILING-SHIPS

Ansaldo-San Giorgio submarine-type Diesel-engines have been installed on a number of Italian sailing-ships, including the "Aosta" owned by the Societa Il Mare of Genoa, and some vessels owned by the Societa Andora of Genoa, and in ships owned by Quaglia & Galdini of Genoa. Also in some of the French ex-patrol boats, details of which were given in our December, 1919, issue, which are now operating very successfully along the Liguria Coast in commercial work.

TRIALS OF MOTORSHIP "TRITON"

Regarding the Frichs Diesel-engined motorship "Triton," she made a trial trip on Oct. 13th since when has completed some very successful voyages between Denmark, Norway & Great Britain with a fuel-consumption at full-speed (400 shaft h.p.) of 1¾ tons or 0.45 lb. per shaft h.p. A second engine of the same size and type is being installed in the concrete cargo ship "Poseidon." Both ships are owned by the Triton Shipping Co.

MOTORSHIP FOR COPENHAGEN S. S. COMPANY

Materials have arrived and the keel will shortly be laid for a 6,000 tons d.w.c. Diesel motorship at the Baltica Shipbuilding Company, South Harbor, Copenhagen, to the order of the Kobenhavnske Dampskibselskab (Copenhagen Steamship Co.). She will be built, says the "Scandinavian Shipping Gazette" on the ways where the steamer for the Storbelt Co., is now under construction.

SEVEN VOYAGES OF MOTORSHIP "STUREHOLM"
(See Page 620)

	Nom. Dist. nau.m.	Dist. By Log. nau.m.	Hrs. at Sea by Log	Average Running Speed Knots	Fuel Used On Trip Tons	Lubr. Oil Used Lbs-* Kg-†	Cargo Including Fuel Tons	Mean Draught
Goteborg—Baltimore								
Oct. 11—Oct. 27, 1919	3,800	3,737	354	10.5	144	717†	5782	19′– 1″
New York—Goteborg								
Nov. 30—Dec. 15, 1919	3,580	3,561	352	10.1	146½	722†	7049	22′– 6″
Goteborg—Baltimore								
Feb. 7—Feb. 27, (*a*)	4,000	3,876	462	8.4	194	859†	4000	17′– 9″
New York—Gothenburg								
Apr. 2—Apr. 19, 1920	3,615	3,775	356	10.6	160	1543*	7162	23′– 9″
Gothenburg—Havana								
June 14—July 3, 1920	4,650	4,887	440	11.1	165	1650*	6700	22′– 3″
Philadelphia—Gothenburg								
Sept. 18—Oct. 6, 1920	3,736	3,800	366	10.4	163	1654*	7521	23′–10″
Gothenburg—Baltimore								
Nov. 10—Nov. 30, 1920 (*b*)	3,960	3,889	450	8.6	170	1875*	5500	19′– 8″
	27,341	27,525	2,780	9.9	1,142½		43,714	

(*a*). Very bad weather, and detoured to avoid ice off Cape Race.
(*b*). Very heavy weather. Structure of ship damaged.

Deadweight cargo carried in 13 months	43,714 tons
Less Fuel and Water " " " "	1,600 "
Net-Cargo Carried " " "	42,114 "

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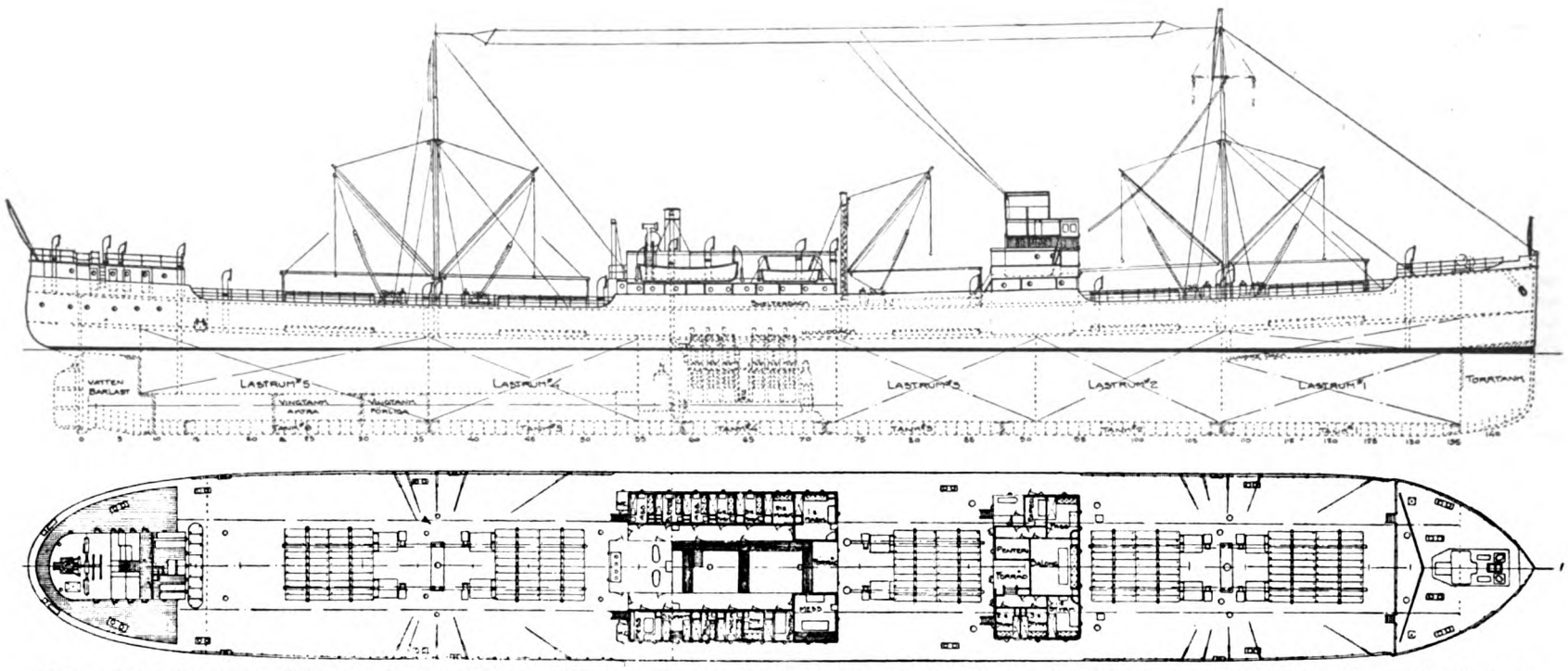


Plans of the motorship "Stureholm," built by the Götaverken. The propelling-machinery only occupies 18 frame-spaces, including donkey-boiler and auxiliary Diesel-electric plants

First Thirteen Months' Operation of a Motorship

Record of the Seven Voyages of the Swedish Diesel-Ship "Stureholm." Total of 42,114 tons Net-Cargo Carried 27,525 miles at 9.9 knots on 1,142 tons of Oil-Fuel Costing $5,712.50

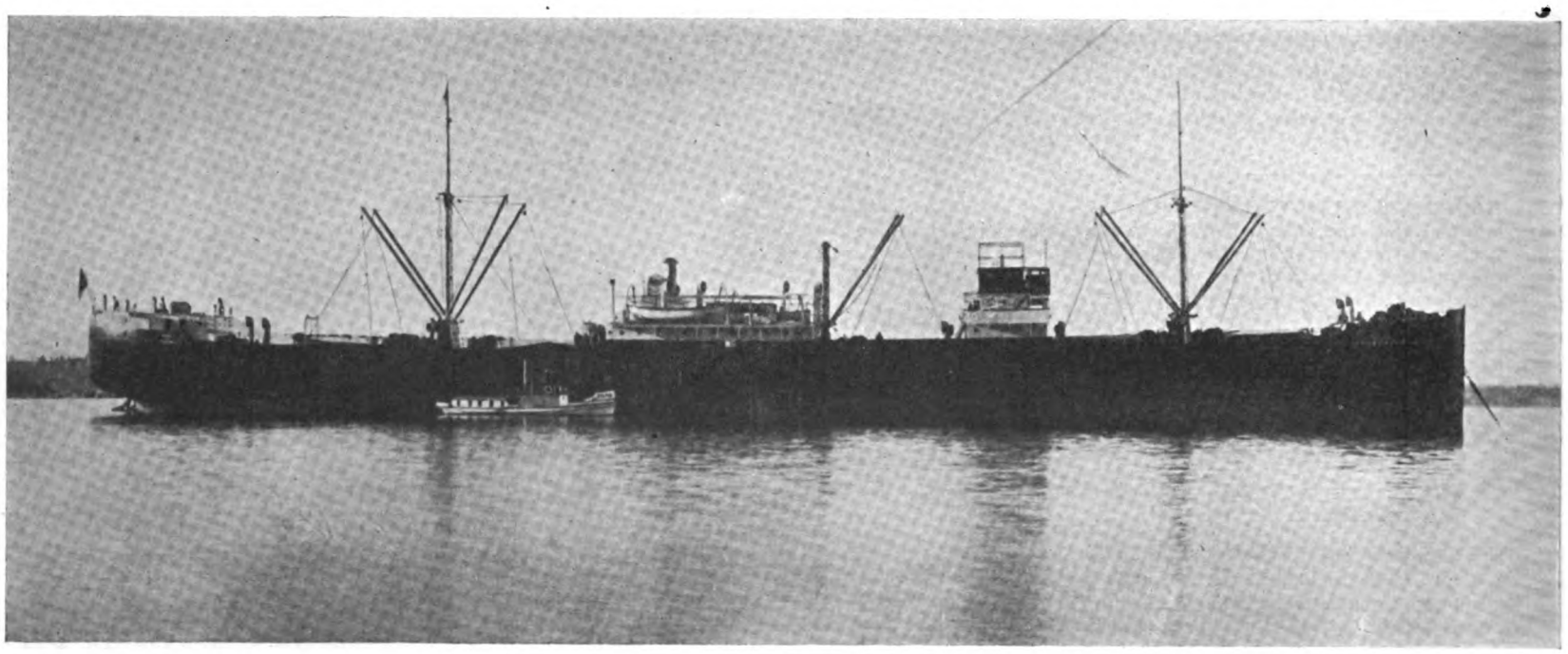
AS far as possible we make a special point of "keeping tabs" on the operation of the more important of motorships now in service—both domestic and foreign, partly in order that we ourselves may be assured of their success and partly to be in the position of placing such information before shipowners who are not yet fully satisfied in their own mind that the Diesel-system of propulsion today is as reliable as steam reciprocating-engines and even more reliable than the average geared-turbine drive. There can be no doubt but that despite the mass of information published by "Motorship," the attitude of ship owners in building steamers now is (as stated by the Anglo-American Oil Company elsewhere in this issue)—only based on ignorance of the facts. Our work in securing and distributing authentic operating datae has been greatly aided by a number of motorship-owners who have been broadminded enough to see the universal benefits for the distribution of such confidential matter, even tho it may result in gain to rival ship-operating concerns.

Possibly our comments may often be considered biased, but in our efforts to furnish our readers with reliable data and unbiased information, we extract our figures from ships' log-books whenever possible, and then analyze and comment upon the same in order to possibly bring-out the points of comparison with average steam-drive. A typical example was to be found in the case of the converted steamers now owned by S. O. Stray and Company and fully dealt with in our last issue.

Recently we made another visit to the Swedish motorship "Stureholm," which we originally described in an issue of April, 1920 on pages 298-299, following a visit abroad with Mr. Kermit Roosevelt and other well-known American shipowners and bankers. This Diesel-vessel has unusual interest for us as we happened to be in Sweden when she started on her maiden voyage just a few minutes too soon for us to get aboard. A few weeks ago she was once again in New York harbor, and our representative was enabled to secure further details concerning the last three voyages through the courtesy of Chief-Engineer Axel Carman. This data we give in an accompanying table and we also repeat the previous four voyages, making seven trips all told.

As all our readers may not have their copy of last April, we will repeat the leading dimensions of the motorship "Stureholm," which vessel was built by the Götaverken and engined by Burmeister and Wain.

Dead-weight capacity	7,800 tons
Actual cargo-capacity of holds with fuel for 10,000 miles in bunkers and stores, etc.	7,200 tons
Cubic capacity (bales)	419,611 ft.
Cubic-capacity (grain)	457,000 ft.
Length (O. A.)	409 ft.
Breadth (moulded)	53 ft. 9. in.
Draught	26 ft.
Indicated horse-power	2,960 H.P.
Shaft horse-power	2,250 H.P.
Engine-speed at sea	140 R.P.M.
Rated power per engine	1,300 I.H.P. at 130 R.P.M.
Daily fuel-consumption (incl. auxiliaries at sea)	10¼ tons
Fuel-consumption per Ind. H.P. hour	0.317 lb.



Swedish-American-Mexico Line Motorship "Stureholm." Details of seven voyages are given on page 203 of this issue.

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Fuel-consumption per shaft H.P. hour....0.418 lb.
Auxiliary power required at sea.....85 b.h.p.
Auxiliary power required in port...85 to 170 b.h.p.
Reserve auxiliary power.....85 b.h.p.
Port fuel-consumption.....½ to ¾ tons
Total crew (officers and men).....32

There is a small oil-fired donkey-boiler for heating the ship, and this unit burns more fuel than all the other Diesel-electric auxiliaries together when used.

The complement of this motorship consists of captain, chief-officer (who also operates wireless) second-officer, third officer, chief-engineer, three assistant-engineers, six oilers, three motormen, one motorman also is electrician, carpenter, bo's'n. Six deck-hands, two apprentices, steward, cook, waiter, and two mess-room boys, a total of thirty-two men and boys.

In connection with the number of crew and their wages and sustenance we desire to point-out to ship-owners of our country that they could with advantage spend the time now consumed in agitating against the La Follette act in studying the enormous economies and savings to be affected by means of Diesel propulsion of ships; because if they are ultimately successful in getting this hampering law repealed the gain will be comparatively small—in fact, far too small to enable our steamers to compete against foreign motorships. After the major economies have been effected then attention can be vigorously centered upon unwise laws.

For instance, the wages and food-bill of an American steamship of the same size as the Swedish motorship "Stureholm" will be from $3,000 to $4,000 more per annum. Whereas, it was clearly indicated in our last article on the "Stureholm" that her additional cargo-capacity and fuel-economy together alone represents approximately $333,720.00 per year, based upon six round trans-atlantic voyages, provided she was fully loaded each voyage. And—the earning power of a ship should be based upon her maximum capacity because she is built for that object.

Unfortunately, we haven't the current Swedish wage-scale before us, but the following table is the wage-scale now current in the Norwegian mercantile-marine. We presume that the Swedish wages are approximately the same.

	Maximum per Month, Kroners
Captains	767
(1) Mates	500
(2) Mates	400
(3) Mates	350
Engineer (chief)	580
(2) Engineers	485
(3) Engineers	415
Stewards	400
Cooks	300
Cooks' mates and cabin boys	80
Carpenters	345
Boatswain	345
Able seamen	316
Ordinary seamen	200
Young men	127
Boys	105
Motor- and donkeymen	345
Firemen	322
Trimmers	215
Engine boys	105

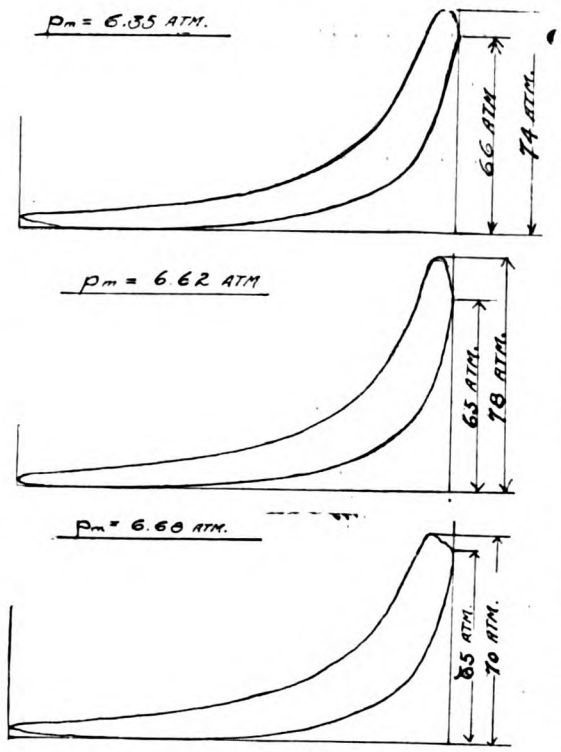
The normal exchange-rate between the United States and both Sweden and Norway is 26.80 cents to the kroner, but the current-rates are about 19c and 22c. respectively. However, in making a comparison only the normal rates should be taken into consideration.

Early this year nearly all the marine steam-engineers in Sweden went on strike after negotiations for a higher wage-scale had failed. They asked 1,655 kroners per month for a 4,000 tons ocean-going cargo-ship, and 2,340 kroners for a passenger-ship.

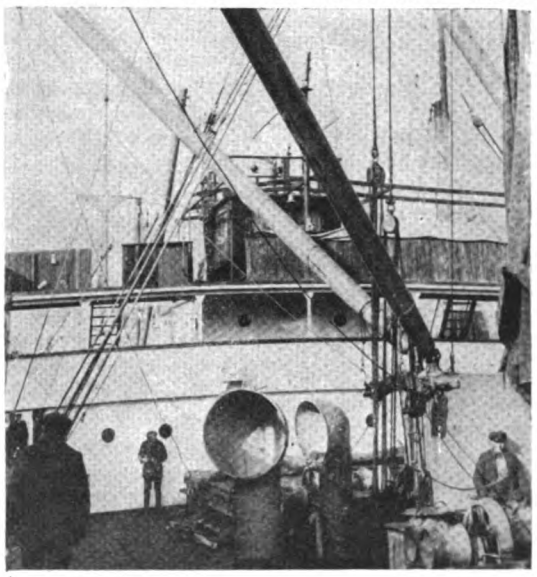
Quite recently we received a letter from a civil engineer of Rasunda, Sweden, who for a long while has been a subscriber to "Motorship." He writes to say that because of the Swedish motorship engineers strike he has taken a position as third engineer on the 9,400 tons 13-knot motorship "Elmaren" of the Transatlantic S.S. Company. His letter was written on board en route to Sydney, Australia.

At the normal-exchange rate Norwegian Captains get a minimum of $204.55 per month and Chief-Engineers $154.44 minimum. As is known, in America there are five grade of Captains and Chief-Engineers ranging from $330.00 to $412.00 and $305.00 to $387.50 respectively.

On this particular subject Mr. Frank C. Munson, President of the Munson S.S. Line of New York made a terse reply to another shipowner; namely, Mr. Fields J. Pendleton, who asked what remedies could be adopted to overcome higher wages on American ships and what must be done to overcome the additional men that had to be carried. Mr. Munson quietly replied that the United States should adopt a Diesel-engine program which would result in the employment of fewer men and a great saving of fuel.



Indicator cards from the "Stureholm's" engines



Captain's bridge on motorship "Stureholm" damaged by heavy sea

When America has converted her steamers to economical Diesel or Diesel-elctric power then can shipowners well spend their time getting the La Follette act repealed, in order to put American motorshipping on an equal basis with foreign Diesel-vessels. Our natural oil-supply will then afford us a big advantage over most foreign shipping, regardless of type.

Regarding the actual results of "Stureholm," as a matter of fact, she only made seven one-way voyages in thirteen months, so the saving has not been $333,720.00. But this has been during a period of bad shipping depression when month after month uneconomical American steamers have been laid-up by the dozen as the conditions got worse until the total now reaches hundreds. All this time the "Stureholm" has been in steady service, and only once half loaded.

What she actually carried in these seven one-way voyages can be seen in the appended table. Although she is of but 7,800 tons deadweight capacity, she carried a total of 43,714 tons of cargo or on an average of 6,245 tons per one-way trip. Of this total amount only about 1,600 tons was represented by fuel, fresh-water and stores consumed by her engines and crew, leaving a total of 42,114 net tons of money-earning cargo actually transported.

Then again, to carry this cargo a total distance of 27,525 nautical miles at an average speed of 9.9 knots she only burned 1,142½ tons of fuel-oil.

We will be glad if some American firm of shipowners will kindly furnish "Motorship" with similar figures concerning the operation during the same period of one of their steamers of approximately the same overall dimensions and power as the "Stureholm." They will form most interesting and valuable comparisons.

M. S. "STUREHOLM"

Distance covered in 13 months, 27,525 nautical-miles
Total dead-weight cargo carried (seven trips), 43,714 tons
Total Net-Cargo carried in holds.....42,114 tons
Total fuel, water and stores consumed..1,600 tons
Total fuel-bill (seven voyages).....$5,712.50
Average speed maintained.....9.9 knots

Assuming that the average rate obtained for the net-cargo carried was $12.00 per ton (U. S. A. to Sweden) her earnings for the period must have been $505,332.00 while her total fuel-bill probably has been about $5,712.50, the prices of fuel paid by the "Stureholm" in America having varied from $2.50 to $6.50 per barrel. To get the above fuel-bill figures we have quoted an average price of $5.00 per ton in order to be on the safe side.

Let us here again point-out that motorships engaged in the trans-atlantic route, such as the "Stureholm," have an additional earning power not possessed by steamers, which accounts for the high figures of $333,720.00 being quoted by us earlier in our previous article as an estimated earning-capacity over steam. We refer to the fact that while she only burns about 300 tons on a round trip, she has a bunker-capacity of 1,000 tons. This means she can fully load her oil-compartments in the U. S. A., sell 600 tons in Sweden and still have ample left for the return voyage. When a motorship does this it means that she has absolutely no fuel-bill whatever, but is actually making a profit out of her fuel space.

Doubtless, these figures will seem so extraordinary to some steamship owners that they will doubt them. We will be glad to personally conduct such shipowners to motorships in harbor at the first opportunity, and let them secure their own figures and information direct.

We have endeavored to outline the foregoing facts as they are to-day, in order that American shipowners and shipbuilders may realize that our useful propaganda work is based as a very solid foundation.

Finally, we should state that on the latest voyage to New York, the excellent showing includes a period of terrific weather. During one day a heavy sea carried away a part of the railing on the captain's bridge. Water which came down the ventilator-pipe of the fuel-supply tank caused a stoppage of only ten minutes. Another sea came through the engine-room, skylight, flooding the engine-room momentarily with two feet of water and short-circuiting the starting-box for the daily fuel-supply pump. A spare starting-box was fitted and the pump made ready for running before the time came for refilling the service-tank and no interruption of the running of the main-engines resulted from the flood.

As to the question—is the Diesel ship genuinely reliable? the records of the voyage prove this beyond doubt. Chief-Engineer Carman's endorsement of her machinery is absolutely and unqualified. Yet this vessel has an old pair of Diesel-engines that had been laying on the dock for several years before installation. All such theories as "America hasn't any good Diesel engines," or "America hasn't any skilled operators," etc., are purely evasive to "stall off" the salesmen of Diesel concerns who desire shipowners to take definite action and to induce them to take the trouble of seeing for themselves. Enough of this evasion, let our shipowners show their business commonsense and do something tangible and worth while, before their present vessels are driven off the seas by economical foreign motorships such as the "Stureholm" and dozens of others that regularly call at American ports.

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MOTORSHIP

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SOLUTION OF AMERICA'S SERIOUS SHIPPING PROBLEMS

What has only recently become apparent to some American shipowners, has for a long time been obvious to those who possessed a little discrimination and far-sighted judgment. Under normal conditions steamships cannot be profitably operated under the U. S. flag in competition with foreign motorships, and for years we have been using a sledge-hammer in our endeavors to drive this fact home. Many of our readers will remember that in November, 1918, we asked, "What will the nation say if after the war it discovers itself saddled with hundreds of merchant-ships of an uneconomical type that cannot be operated against foreign motorships without imposing a heavy burden upon the people?" A few weeks after those words were penned the Armistice was signed. That was two and a half years ago! Results, however, speak louder than words, and the shipping slump that recently came with rapidity has had the effect of waking-up shipping-men to the substantiality of our warnings. But it seems almost too extraordinary that nothing should have been done since 1918 to meet this situation, either by the Shipping Board or by private shipowners.

Since our February issue was published, Mr. Wm. Averell Harriman in a speech declared that our merchant-marine is in a dying condition and that prompt measures must be taken to save it. In the same room Admiral Benson again maintained that the necessity of reducing the cost of operation of ships was the chief problem now confronting the country and that vessels must be given greater motive power, using the Diesel engine or Diesel-electric drive, thus reiterating his statements made at the recent Marine League dinner, when Mr. Frank Munson, of the Munson Steamship Line, also declared that the uneconomical steam-engines and boilers must be removed from the Shipping Board's steel ships and replaced with this new economical class of power, or else be unable to compete with foreign shipping.

Hundreds of fine steel ships are laid up at the present time, so now is the psychological moment to scrap their "useless" steam machinery in a wholesale manner and replace them with an economical type of power that will enable them to be sent to sea and hold their position regardless of all-comers in the way of fair competition. Absolutely without doubt these vessels will have to be converted, so let it be done now. Further delay is maritime suicide! Next year foreign shipping competition will be more strenuous than ever, and well over one-hundred additional European motorships of 4,000 to 18,000 tons d.w.c. will be in service, and many more up to 25,000 tons d.w.c. will be under construction.

Mr. Harriman urges Government subsidies to assist American shipping! If a subsidy be given, we believe that the wisest course will be to let it take the form of a straight grant of somewhere between $50 and $75 per shaft horse-power on every existing steamer when converted to Diesel or Diesel-electric power, and a certain subsidy on every new motorship ordered. Subsidizing existing, or new, uneconomical and oil-wasting steamships would purely be a sheer waste of the nation's funds. In the case of conversions the subsidy should be based—not on the existing power, but on the new plant in order to encourage higher speeds and quicker turn-rounds up to the limits of commercial practicability and economical operation.

Thus a steamer of 10,000 tons net-cargo capacity, 3,000 shaft h.p., 11½ knots speed, burning 32 tons of oil-fuel per day, should receive a subsidy of $200,000 to $300,000 for conversion into a motorship of 11,000 tons net-cargo capacity, 4,000 shaft horse-power, 13 knots speed, burning but 18 tons of oil-fuel daily, the shipowners, of course, to stand the balance of the cost. The enormous advantages thus accrued must be obvious to everybody. An addition of 2½ knots in speed and about one thousand tons of cargo-capacity is gained, while the fuel-consumption is reduced by 40 per cent. Also firemen are eliminated. Some ships are suited for the Diesel-electric drive, others are better adapted for direct Diesel propulsion. This the owners will have to decide in accordance with individual ship designs and trade routes.

In view of these vast economies is it surprising that Mr. Wm. Denman recently urged Congress to appropriate sufficient funds to convert one million tons of existing steamers to motor power?

AN ALTERNATIVE CONVERSION PLAN

In an interesting article to be given next month a chief-engineer of an American steamship proposes an interesting alternative for giving existing steamers a means of operating profitably. In cases where the owners believe it would not pay to tear out the present machinery, he suggests that oil-engines and electric generators be installed as an additional power for the purpose of operating the cargo-winches, electric light, etc., when the vessel is in port, thus allowing the main boilers to be shut-down, as some standardized steamers of 9,600 tons d.w.c. operated by a well-known firm burn from 15 to 25 tons of fuel-oil per day when in harbor loading and unloading. This is unusually high, the general consumption being from 5 to 8 tons per day. With oil-engine-electric auxiliaries the fuel-consumption for a vessel of this size would be reduced to one-half to one ton per day with similar cargo handling speeds and powers. For operating the donkey-boiler this engineer proposes to utilize the exhaust-gases of the oil-engines, a practice adopted with success in the past with some foreign tankers.

STOP THE CRIMINAL WASTE!

In the first nine months of last year, bunker-oil supplied to steamers in American ports was more than double that of the same period of 1919, and totaled 4,614,956 tons. This amount could have been reduced to about 1,500,000 tons had all these ships been Diesel-driven, and much valuable oil thus saved.

AMERICAN SHIPBUILDER RETURNS FROM EUROPE

Shortly after his return from Europe, we had the pleasure of interviewing Mr. H. M. Robinson, president of the Merchants Shipbuilding Corp., who had been investigating shipbuilding abroad, including in Great Britain. Mr. Robinson has returned enthusiastically in favor of the Diesel-motorship and is convinced that its extensive adoption is absolutely essential if America is to successfully maintain a large merchant-marine. Two large motorships are now being built at his own shipyard!

OUR SPECIAL CANAL INVESTIGATIONS

For the purpose of making the most thorough investigation of the transportation facilities on the New York State Canal yet attempted, and with a view to ascertaining the most economical methods of carrying all classes of products, and for making comparisons with charges for railroad hauling, etc., "Motorship" at no small expense has sent a Special-Commissioner through the Canal zone interviewing barge-operating companies, builders, state officials and many others interested—or opposed to, as the case may be—in the welfare of this magnificent and valuable waterway. These investigations will be continued for many months, and we believe the result will demonstrate that the oil-engine will play a great part in bringing about an economical system of propulsion for canal craft. The reports of our Special-Commissioner will be given in a series of articles, the first of which appears in the current issue. We believe that there is a great field for the small and moderately powered heavy-oil engine as a propulsive and auxiliary machinery driving medium in canal craft. Co-operation of everybody concerned is especially requested.

PROPOSED MOTORSHIP ENGINEERS' REGISTRY BUREAU

Some excellent suggestions are made in our correspondence columns this month by an American motorship-engineer, and we believe his proposals could be acted upon by shipowners to their advantage. This is the formation of a central Bureau of Registration for experienced oil-engineers where the records of numbers would be kept on file, also the performance of motorships operated by them. In this manner skilled engineers would be available at all times. We believe that engineers would willingly co-operate with shipowners and utilize the facilities to the greatest extent. It is entirely up to shipowners to make a move in their own interests. Several years ago we urged shipowners to co-operate in the formation of a fund for building, placing a small motorship engineer training-ship in service, but nothing was done.

THE HIGH-POWERED GERMAN DIESEL-ENGINES

Our readers are now familiar with the fact that completed, tested and now laying idle dismantled in the builders' works in Germany are two marine Diesel-engines of 12,000 shaft horse-power each, both of the two-cycle type in six double-acting cylinders. One of them is at the Krupp shipyard in Kiel, and the other at the Nürnburg plant of the M. A. N. We are now enabled to add some remarkable information concerning the engine built at Nürnburg. One of the tests of this great marine Diesel-motor was of 6 days non-stop duration, and for two days during this period an average output of sixteen thousand (16,000) shaft horse-power was developed, making it the highest powered Diesel-engine in the world.

It only remains for this engine, and the Krupp duplicate engine, to be tried out in a ship. Some far-sighted and courageous American shipowning firm should purchase these great engines and install them in some large passenger liner in which the present steam-machinery is nearly worn out. That these engines safely developed 4,000 horse-power over their rated load for 48 hours is a fair indication that they would run almost indefinitely at their normal load of 12,000 shaft horse-power. Because of the vastness of the "experiment" we would not be at all surprised if the

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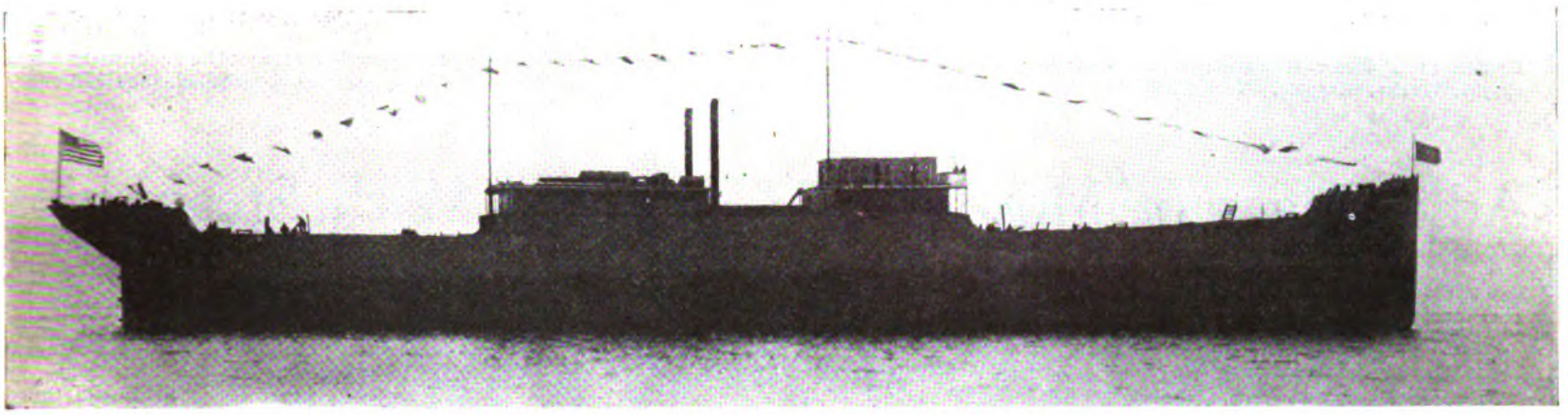
builders would accept the major part of the payment upon completion of first voyage if permission to sell was granted by the German authorities.

What a splendid opportunity for one of our large ship operating concerns. It would give them a wonderfully economical 20-knot passenger motor-liner of about 600 ft. length burning but 130 tons of oil per day, and have a total machinery-space of only about 85 ft. length and have no firemen. With such a ship, the passenger-rates could be lowered to a figure way beyond those possible today and her cabins would always be full even when other vessels were running half filled. If too large a sum of money is involved for a private firm to undertake the purchase of these engines, we offer the suggestion that the Shipping Board co-operates and shares half the expense. These engines in operation in an American ship would be of vast technical value to shipbuilders and engine-builders in this country, as they are away ahead in power of anything yet constructed.

When the first three cylinders of this big engine was being tested in 1913 at the factory, an explosion of oil-vapor in the exhaust-pipe smashed the measuring fuel-tank and blazing oil poured over the engine, inflicting serious damage. Repairs were afterwards made and the three remaining double-acting cylinders constructed, making the 12,000 b.h.p. total, and final tests were then run with very successful results. At first difficulty was experienced, not with the lower cylinder-heads and stuffing-boxes, but with the upper heads, because of the intense heat. This, however, was safely overcome to the satisfaction of the designers. After the first series of heavy tests of the complete engine many of the cylinders, pistons, bearings and cylinder-heads were interchanged and further tests made with satisfactory results.

Blohm & Voss, the well-known shipbuilders of Hamburg, are now completing two most interesting motorships for the Hamburg-American Line's transatlantic freight service. They are cargo-carrying motorships of about 14,000 tons d.w.c., in each of which twin ten-cylinder 3,000 shaft h.p. Augsburg Diesel-engines are being installed. These engines are not direct-connected to the propeller-shaft, but will drive through reduction-gearing. The engines, we understand, will not be operated at their full load but at slightly reduced revolutions, and together will produce about 5,500 shaft h.p., or sufficient to give the vessel a loaded speed of about 13 knots. If these lightly-built, high-speed submarine engines will stand up to the work of propelling such big ships, it will mean a big "boost" for the Diesel-electric drive, as the ideal Diesel-engine for electric drive will be a cross between a land power plant Diesel-engine and a submarine engine. That is to say, lighter than the one and heavier than the other, and with a speed of between 250 and 350 revs. per minute according to power. In this manner a reliable generator-driving engine will result. We are not yet convinced that mechanical reduction-gears with such big engines will be as satisfactory as the electric system, so await the arrival of the first of these ships from Germany with much interest. This should be about the end of June next.



Alaska Steamship Co.'s new motorship "Kennecott" constructed from laying of keel to the launching in 50 working days without one hour of overtime, by the Todd Shipbuilding & Dry Dock Co.'s Tacoma Plant. Two 1200 i.h.p. McIntosh & Seymour Diesel engines are being installed. Her dead-weight-capacity is 6,500 tons. In addition to the regular cargo she will carry 1,500 bbls. of fuel-oil and 4,500 bbls. of oil-cargo in her double-bottoms. Complete details appeared in "Motorship" of October, 1920.

LARGE MARINE DIESEL-ENGINE REQUIRED

We have been given to understand that Mr. Alexander McDougall, President of the McDougall Duluth Shipbuilding Co., of Duluth, Minnesota, will shortly be in the market for a Marine Diesel-type engine of about 1,100 H.P.. We suggest that oil-engine builders get into communication with the above gentleman.

ROYAL MAIL CO. TO ENTER U. S. FRUIT TRADE

According to reports the Royal Mail Steam Packet Co., who have three 8,000 tons Diesel motorships under construction in Great Britain, is to open a monthly series in the fresh-fruit transportation trade from the Pacific Coast to Europe.

ANOTHER FRUIT-CARRYING MOTORSHIP LAUNCHED

"Sevilla," a new British-Werkspoor Diesel-engined motorship was launched during January last to the order of Otto & Thor Thoresen Line, Christiania, for the fruit-carrying trade. The builders of this vessel are Wood, Skinner & Co., Bill-Quay-on-Tyne, Newcastle, and twin Werkspoor-type Diesel-engines are being installed by the North Eastern Marine Engineering Co., licensees of Werkspoor. Both the ship and engines have been built to the Norwegian Veritas, all modern cargo-handling devices have been fitted including steel derricks and electric-winches. In addition to cargo, a certain number of passengers will be carried in cabins on the bridge-deck.

THE ARDROSSAN AND BALTICA MOTORSHIPS

Hitherto the names of the owners of the three 9,000 tons d.w.c. Burmeister & Wain engined motorships building by the Ardrossan Shipbuilding & Dry Dock Co., Ardrossan, Scotland, have been kept secret. Two of them are for the Gylfe Steamship Co. of Copenhagen (Th. Just, Mgr.) which concern also owns the two 6,000 tons d.w.c. B. & W. Diesel motorships building at the Baltica shipyard, Copenhagen, the constructional materials for which were purchased in the U. S. A.

The third Ardrossan 9,000 tons motorship is for the United Steamship Company, of Copenhagen, owners of the m.s. "Oregon" and "Californian," who also have a new 7,000 tons d.w.c. B. & W. Diesel motorship building at the Nakskov yard.

MOTORSHIP-FUEL AVAILABLE, BUT NO STEAMER-OIL

According to a report no fuel-oil for steamers was recently available at Piraeus, Greece, but Diesel-oil was obtainable at $9.00 per barrel.

SHIPPING BOARD CONTRACTS FOR COAL AT $7.39 PER TON

A contract for 300,000 tons of coal has been placed by the U. S. Shipping Board at $3.73 at the mine, or $7.39 per ton alongside ships, the coal to be delivered during the coming twelve months.

The U. S. Shipping Board pays about $15.50 per ton for fuel-oil, and as coal-fired steamers use from four to five times the weight of oil-fuel burned by motorships it will be realized that a Diesel fleet would receive enormous economies. Let the Government convert these fuel-wasting vessels to Diesel power.

LATEST NORWEGIAN MOTORSHIP STATISTICS

At the beginning of 1921 there were no fewer than 1,497 Diesel motorships and other oil-engined commercial-vessels aggregating 222,871 tons gross, representing an increase over the previous year of 120 motor-craft of 36,517 gross-tons total. Only 97 steam-driven ships were constructed during the same period. These are official returns.

NEW AMERICAN SUBMARINES

A number of large submarines are already launched, or on the slips, at the Fore River Plant of the Bethlehem Shipbuilding Corp. Ltd. These consist of two AA-type submarines of 1,500 tons surface-displacement and 269' length, and are the largest Diesel-driven craft of this type ever built in the U. S. A. They have been illustrated in "Motorship." There are also twelve S-type submarines of 900 tons surface-displacement and 220' length. Keels are soon to be laid for six submarines of 225 ft. length. In some new U. S. Navy yard-built submarines now building, twin 2,400 b.h.p. Busch-Sulzer two-cycle Diesel engines will be installed. These engines are the highest-powered submarine units ever constructed in the United States.

HUDSON AND ATHENS FERRY BOAT

Referring to the motor-ferry boat for the Hudson & Athens Ferry Company now building at the Anchor Shipbuilding Company's yard from designs by Eads Johnson of New York, a 200 b.h.p. Ingersoll-Rand mechanical-injection oil-engine is to be installed.

ROYAL DUTCH-SHELL HEAD KNIGHTED

That business and financial genius at the head of the great Royal Dutch-Shell oil combination—H. W. A. Deterding, has been knighted by King George of England. The French Government has also honored him by conferring upon him the Cross of the Legion of Honor.

NEW AGENCY FOR "MOTORSHIP" IN GERMANY

Readers of "Motorship" in Germany who may have had difficulty in securing copies of this publication in that country will be pleased to know that we have concluded arrangements with Mr. Julius Springer, the well-known technical publisher, Linkstrasse 23-24, Berlin W. 9, to act as our sales-representative in Germany. Subscriptions to "Motorship" may be sent to Mr. Springer direct, the subscription price being 300 marks per year.

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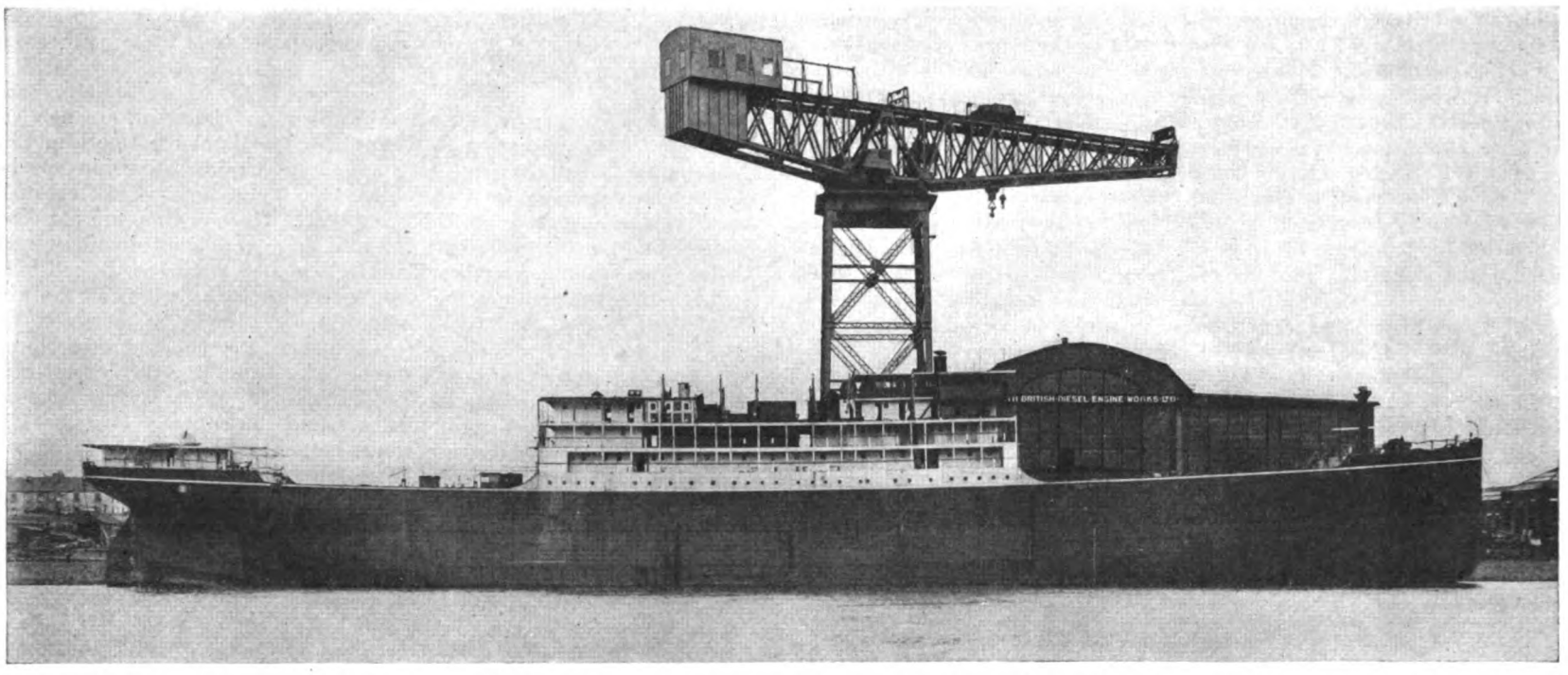

British India Steam Navigation Co.'s passenger-cargo motorship "Magnavana" having her Diesel engines installed at the North British Diesel Engine Works, Glasgow. Two 3,300 i.h.p. North British Diesel-engines and complete Diesel-electric auxiliaries are being installed. She will carry 150 first and second-class passengers and 10,500 tons of cargo.

Advantages of Motorships Compared With Steamships

Suspicious Attitude of Some Shipowners Can Only Be Based on Ignorance of Facts

BY THE ANGLO-AMERICAN OIL CO., LTD.

[The following opinion regarding the reliability, economy and advantages of Diesel-driven ships by this well-known American-British oil company, doubtless will be read with interest as the Anglo-American Oil Co. is the British branch of the Standard Oil Co. They have backed their faith in the new economical power by building two 10,500 tons d.w. motor-tankers, the "Narragansett" and the "Seminole," the first of which already has made several voyages to New York, while the second will soon be here on her maiden trip. We are indebted to "Oil Power" of England for the reproduction of the following.—Editor.]

TO those familiar with the progress of the motorship during the last decade, and its overwhelming advantages over the steamship, it is a source of surprise that any owner should be foolish enough to purchase the latter if they they can obtain the former. Yet vessels to be propelled by steam machinery are being built in large numbers at the present time by shipowners who still regard the oil-engine with grave suspicion. This attitude can only be based on ignorance of the facts.

It is proposed to show in the following how reliable the motorship has become, how great are its advantages over the steamship, and how favourably it is regarded abroad and by a few progressive shipowners in this country.

Even the warmest advocate of the motorship will not deny that tronble at sea has been experienced with large marine oil-engines in the past; but some failures, owing to lack of experience, have always accompanied the advent of new prime-movers: even the steam-engine has been no exception to this rule. With any new machinery the faults are only eliminated after many years of extensive practical use. In the case of the large marine oil-engine it is surprising that so little trouble has been experienced at sea, even with some of the older examples. In support of this reference may be made to the good services still being obtained from the machinery in the motor-tanker "Juno," which was put into commission in 1912. This vessel is fitted with single-screw oil-engines of 1,330 indicated horse-power, and she is still running regularly. Tests gave a consumption of 0.35 lb. of fuel-oil per indicated horse-power per hour and an average speed of 9.64 knots.

More recently the motorship "Glengyle" did the round voyage from England to Vladivostock and back without any stoppage of the engines due to defects, while from Singapore to Suez—about 5,000 miles—a non-stop run was made. During the voyage the consumption of fuel oil was about 0.325 to 0.36 lb. per indicated horse-power per hour, and her average speed 10.5 knots.

We now come to another point in connection with stoppages at sea, this being the type of trouble experienced. With oil-engines any stoppages that occur are usually caused by failure of the smaller gear, accessories, etc., such as oil-fuel pumps, air-compressors or piston-cooling devices, which can quickly be put right. Cracked cylinder covers, at first a fruitful source of trouble, have now become very rare, as are troubles with main moving parts, the only common moving part being the crank-shaft. Hence, when a failure occurs, it is a simple matter to cut-out one-cylinder and its parts altogether until repairs can be effected, the reduction in power being almost negligible in 6 and 8 cylinder engines. This feature contrasts favourably with reciprocating steam-engines or even turbines, in which the parts are dependent on each other throughout. The above consideration brings us to the position that troubles at sea are not now more frequent with oil-engines than with steam-machinery when the latter is taken to include boilers and auxiliaries.

That breakdowns to steam-engines leading to serious results are not unknown, is shown from time to time in the records of losses of ships at sea. Another feature worthy of consideration is the possibility in a steamship of the boilers being put out of action by water entering the stokeholds and extinguishing the fires. Flooding of the engine-room could, of course, take place in a motorship, but the water would not stop the engines so quickly. In fact oil-engines could be so constructed as to run until the water reached the cylinders, and, although steam engines could be similarly modified, this course would be futile if the supply of steam could not be maintained. Finally, if the oil-engine is not quite so reliable as steam machinery at sea, the difference is too small to effect the progress of the former for ships' propulsion.

When making comparison between steam and oil engines in favour of the latter, it is only fair to select the best designs of either type. During the last two years so many ships have been fitted to burn oil-fuel in place of coal that we may safely assume the former to be the more economical fuel. Then again, geared-turbines are being largely installed, and it is evident that this is deemed to be the most economical form of steam-machinery. Among oil-engines the four-stroke type is the more economical. Comparisons will, therefore, be made between oil-fired geared-turbine steamships and the motorships having four-cycle oil-engines.

First and foremost there is the saving in space, which amounts to 30% for the machinery alone in favor of the Diesel plant, when due allowance is made for the elimination of boilers and bunkers. The saving of fuel depends on the respective consumptions per indicated horse-power per-hour for the rival types of machinery. Figures for motorships have been already stated as about 0.33 lb. per indicated horse-power per hour. The consumption of oil fuel in a geared turbine steamship is seldom below 0.990 lb. per indicated horse-power per hour and may be even higher, or exactly three times that of the motorship. The amount of reduction that can be made in the bunker capacity depends on where a vessel is sailing to the duration of the voyage and the cost of oil-fuel at either end. A motorship would only consume one-third of the oil-fuel required by a steamship and a proportionate reduction could be made in her bunker space, and additional cargo carried.

With motorships no standby losses occur as with steamships, as the oil-fuel allowed for the steamship is based only on the consumption when under way and with the machinery in perfect order. Then again, with steamers, when entering and leaving port, delays are not infrequent, during which period either the steam-pressure is maintained or has to be raised when the engines are wanted. In other words, loss of fuel is incurred owing to radiation and leakages from boilers and piping. Then, as a voyage proceeds, both internal and external surfaces of boilers become foul, and more fuel is burned to transmit heat through the plates to the water. Moreover, leakages arise, and there is a general falling-off in efficiency which demands an increasing consumption of fuel to maintain the supply of steam.

The efficiency of oil-engines is not affected by any of the above-mentioned features and is maintained throughout the longest voyage, while no standby losses occur, fuel only being used when the engines are running.

The stokehold staff who attend to the boilers in a steamship are not required in a motorship, hence a saving in wages can be effected in this direction,

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and for the class of vessels of 8,000-10,000 tons capacity this is equal to about 12 per cent of the total wages bill in favor of the motorship.

Cleaning and repairs cost less in a motorship owing to the absence of boilers and auxiliaries, while the numerous stuffing-boxes that need so much attention and frequent repacking in a steamship are almost entirely absent. There is a reduction in the machinery space, equal to an increase of about 10 per cent in the vessel's capacity for carrying additional cargo by measurement which can be taken advantage of when comparatively light-weight cargoes are carried.

All the maritime nations have greatly increased their shipbuilding capacity during the war, and in a few years we shall be faced with a glut of ships, when freights will come down, and only the most efficient types of cargo-carriers will be able to make a living. That the motorship is more economical than the steamship, few will deny after making themselves *au fait* with the facts; hence the former is certain to oust the latter when competition for freights becomes keen. This position is more fully appreciated abroad than in this country, although some progressive British shipowners are building motorships as fast as they can be obtained.

Summing up briefly the many advantages of motorships as compared with steamships may be stated as follows:

A saving of 66 per cent of the oil fuel used in steamships, a reduction of 12 per cent in wages and a 10 per cent increase in cargo capacity on the same dimensions as steamships.

Motor-Tankers "Seminole" and "Narragansett"

Performance of the "Narragansett"—Saving of $43,419.00 Per Voyage Compared with Oil-Fired Steam-Tanker—Frank Opinions of Her Owners.

IT is most regrettable that the leading American oil-companies have not taken a similar attitude towards the economical oil-burning Diesel-motorship as that of the Anglo-American Oil Co. (British subsidiary of the Standard Oil Co.) who have boldly expressed their belief in this power as given elsewhere in this issue of "Motorship." They have backed their beliefs by building the two sister 14,000 tons loaded displacement motor-tankers "Narragansett" and "Seminole," and the performances of the first of these ships to date have fully corroborated their faith in Diesel-propulsion both in economy and reliability as the figures presently given will conclusively prove.

The "Seminole" was launched during December last, while the sister motorship "Narragansett" has already made several visits to the States, having been placed in service on July 4, 1920. Compared with another ship owned by the Anglo-American Oil Companies but propelled by oil-fired steam engines, the m.s. "Narragansett" has shown a saving of £8,934 ($43,319.00 at normal exchange rates) per round-voyage in the fuel-bill alone, without taking into consideration her greater cargo-carrying capacity.

Based on available fuel-costs of the steam and Diesel ships in a round voyage from Liverpool to New Orleans and return, the figures are as follows and include consumptions of auxiliaries, heating, steering, etc., the motorship having a large donkey-boiler for working the auxiliaries:

Oil-fired steamship, 1,289 tons of fuel-oil at £10-7-6 per ton	£13,373
M. S. "Narragansett" 386 tons of oil-fuel at £11-10-0 per ton	£4,439
Actual saving effected in oil-fuel alone in one return voyage	£8,934 or $43,419

The "Narragansett" burns 9¼ tons per day for the main Diesel-engines, and 2¾ tons for the boiler, compared with 36 tons of oil per day for the steamer, or 55 tons per day for a coal-burning tanker. The actual shaft horse-power hour consumption of the twin 1,250 b.h.p. Vickers engines of the m.s. "Narragansett" has worked out at 0.423 lb. although comparison figures often given by "opposition-interests" are quoted as being 0.55 lb. or 0.60 lb. per shaft h.p. hour.

In the case of the above motorship the total daily-consumption would be reduced by two tons were she equipped with Diesel-electric auxiliaries, and the exhaust-gases used towards generating steam for keeping heavy oil-cargoes in a liquid state.

Another point of interest is the question of speed. The oil-fired steamer is of slightly higher power. Over the same number of voyages the oil-fired steamer averaged 10.25 knots on 35 to 36 tons of oil per day, and the coal-burner averaged only 9.8 knots on 55 tons per day. The m.s. "Narragansett" average has been 10.08 knots on 12.09 tons of oil (including all auxiliaries) over a distance of 16,758 nautical-miles. Extracts from her log up to the middle of December last are herewith given. She will be back in the U. S. A. again before this article is in print, so will have another record to be added. The average shaft h.p. maintained at sea is 2,120 compared with her designed out-put of 2,500 b.h.p.

On one of her voyages the "Narragansett" had to make a trip from London to Manchester via Liverpool. She arrived at Liverpool early in the morning and entered the Ship Canal at Eastham Lock at 8.10 a. m., the passage from London being:

Distance .....564 nautical-miles
Time.....2 days, 1 hour, 32 minutes
Average speed .....11.39 knots
Diesel-Engines .....23.3 tons
Donkey-Boiler .....6.5 tons
Fuel Consumed—

The ship was delayed at Eastham all day Friday as there were no tugs available, and she left for Manchester at 6.45 a. m. on the Saturday, arriving at the Oil Wharf at 4.39 p. m. The engines worked very well, and gave no trouble whatever. The following maneuvering orders were given from the bridge:

Port	*Starboard*
412	415
195 Starts	195 Starts
45 Reversals	58 Reversals

In view of the foregoing economies and reliable performances, we are not surprised that at the launch of their second sister motorship—the "Seminole" at Vickers shipyard, Mr. F. E. Powell, chairman of the Anglo-American Oil Company, in his speech made some startling remarks which should interest other American oil companies and shipowners. He said:

"I think we might call these motor-ships milestones in the progress of merchant shipbuilding and that there may be many more of these milestones to the credit of this great firm is the earnest hope of myself and my colleagues. We cannot speak too highly of the efficient and most satisfactory manner in which the work on these ships has been carried out. I may tell you that not only is the m.s. "Narragansett" being watched with the greatest interest by large shipowners on this side, but many of the important companies in America are following her movements with the keenest interest. We know that this means more than mere curiosity on their part.

"At a recent launching at which I was a guest at one of the large yards in Philadelphia it seemed to me a pity that the ship going-off the ways was a coal-burning vessel. It seemed as if I was witnessing an anachronism. If there is any vessel that ought to be equipped with Vickers Diesel-type of propulsion, it ought to be a tank-vessel, so that where she takes cargo she takes fuel, and as the refineries cannot make the cargo without making the fuel, the thing links up and makes this type of vessel logically the proper type for tank-vessels given all the other conditions.

"As regards the remarks which your chairman made in quoting Lord Pirrie, I had the good fortune to cross with him recently from the other side and had several interviews on this very delicate subject of oil-fuel supply. If I understand his ideas correctly he takes the position that the use of oil-fuel under boilers in anything less than an ocean-liner or a tanker is something in the nature of sacrilege, because oil-fuel is more badly needed in other lines of men's endeavour."

"When you hear talk of the quantity of fuel and petrol available in the world, your minds revert to motor-car fuel because that is the fuel that all of us use in every-day life. Second to that comes Diesel-fuel for Diesel-engines. Fortunately the quantity of Diesel-fuel consumed on ships using that power is only about one-third of what they would require for burning fuel under boilers. I recently made an extensive trip through the oil-fields of America, and I feel confident in stating that so far as the supply of Diesel-fuel coming from the United States is concerned, it is the country which stands foremost, and we are prepared to do what is necessary to guarantee that the supply will be forthcoming."

Following Mr. Powell's speech Mr. James Hamilton (vice-chairman of the Anglo-American Oil Co.) remarked that "his fellow-directors and himself had watched with considerable interest the very successful achievement of the sister motorship to the vessel whose launch they had witnessed. The splendid results achieved by the "Narragansett" were in themselves a surety of the success of her sister, the "Seminole."

"On her last voyage from the States the 'Narragansett' was scheduled to discharge a portion of her cargo at Thames Haven and he took the opportunity of paying a visit to the ship with the object of making personal inquiry as to her behaviour on what had been a very stormy voyage. The ship, he was pleased to say, was in splendid condition, and he was greatly impressed by the cleanliness and good order of the engine-room. He took the opportunity of asking members of the they had experienced, and the replies he received were that no trouble had been experienced and he gathered they were rather sorry on this account, as they would have welcomed a diversion just to relieve the monotony of the voyage."

In every way the "Narragansett" has come up to the highest expectations of her builders and owners alike, and has justified the confidence in heavy-oil engines for marine propulsion. The following advantages are possessed by her over similar vessels fitted with steam-driven machinery, viz—

1. Increased cargo-capacity.
2. Much lower fuel-consumption and fuel cost.
3. No standby losses due to main-boilers having to be alight.
4. Reduced staff, no firemen or trimmers being required.
5. Less cost of upkeep; no main boilers to clean or repair.
6. Less danger to life.
7. Full power can be developed almost immediately either ahead or astern.
8. Less liability of total breakdown. A single-cylinder of the oil-engine may be put out of action without stopping the engine.

LOG OF MOTOR TANKER "NARRAGANSETT"

From / To	New Orleans Liverpool	Barrow New York	New York London	Liverpool New York	New York Liverpool
Date From	4-7-20	25-9-20	16-10-20	16-11-20	4-12-20
To	22-7-20	9-10-20	30-10-20	30-11-20	17-12-20
Distance—Nautical Miles	4,528	3,013	3,204	2,985	3,028
Running Time, (hours)	402	325½	313	317	289
Average Actual Speed (knots)	11.1	9.25	10.2	9.41	10.48
Mean Revolutions of Engines	118	111.	117.3	114.4	117.9
Engine-Fuel Used per day, (tons)	9.61	9.36	10.51	9.23	10.76
Boiler-Fuel used per day, (tons)	2.13	2.16	1.71	2.95	2.03
Total Fuel-Consumption per day, (tons)	11.74	11.52	12.22	12.18	12.79

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9. No falling off in economy. The results obtained on trial can be relied upon, or even better. Whereas with steam-machinery, boilers may become fouled inside and out, glands, joints and piston-rings become leaky which decreases the efficiency of the steam plant.

10. The first cost may be higher, but the oil-engines are of much higher grade than the ordinary steam-plant, resulting in more satisfactory running and decreased depreciation.

11. Fuel is easily carried in an oil-engined ship and the bunkering process is simplicity itself, occupyng a very short time and with no "dust."

Vickers Ltd. have had twenty years' experience in building marine internal-combustion engines, and the following is a short resume of the performances of merchant and naval ships equipped with the Vickers Diesel-engines, viz—

(1) "Circeshell." After 14,000 miles the engines were opened-out and found to be in excellent condition.

(2) "Medway." On maiden voyage from Hong Kong to Balik Papan average speed was 9.5 knots.

(3) "Oweenee." From Clyde to Port Said averaged 9.88 knots for 14 days with a daily consumption of 4½ tons of oil-fuel. This ship has now covered about 17,000 miles without any stop at sea or delay in port.

(4) "Marinula." An oil-tanker of 9,916 tons d.w. with s.h.p. of 2,500. In Admiralty service in Persian Gulf during the war. She was bought by the Anglo-Saxon Petroleum Co. in 1919, and refitted last July for a single trip pending alterations to suit her new owners, but has been running for the last four months in the Gulf of Mexico without any main-engine trouble.

(5) "Trefoil." Oil-tanker of 2,390 tons d.w., 1,500 s.h.p. In service for 18 months without opening any cylinder, and refit only eventually required owing to breakdown of steam-plant. This ship was constantly in attendance on the British fleet during the war.

(6) "Marshall Soult." This ship did strenuous work off the Belgian coast during the war and every call on the engines was answered. Her performances were considered remarkable and she is now a training ship for oil-engineers for the British fleet. She is of 1,600 shaft h.p.

Up-to-date, Messrs. Vickers Limited and their licensees have manufactured internal-combustion engines, fitted with their patent system of mechanical spraying, to a total of 500,000 b.h.p., the diameters of cylinders ranging from 10¾ in. to 30 in. As almost the whole of these engines have been supplied to the orders of the British Government, by whom the makers until recently were required to observe the strictest secrecy.

Before concluding this article we will give a few of the remarks made by Sir James McKechnie at the launching of the m.s. "Seminole," because he condemns the burning of oil-fuel under ships' boilers. Sir James said:

> "It is almost unnecessary to point out that the maximum efficiency of liquid-fuel is only obtainable by utilizing it in internal-combustion engines, and in view of the opinion on the world's oil position recently expressed by Lord Pirrie it has momentary importance, which consumers generally, and shipowners in particular, will be unwise altogether to ignore. Lord Pirrie advises shipowners to go slowly in the fitting of their steamships with oil-burning apparatus, because he fears that, as matters stand, there is grave danger of an oil shortage. I agree with him that in these circumstances shipowners, who are of a mind to convert their *steam*ships to oil-burning, or fit new *steam*ships for oil-burning, will be better in their own interests to go slowly."
>
> "But to my mind, a far more important consideration is that to burn oil under steam-boilers is not only wasteful but wrong in principle. We claim that from the remarkably successful sea performances of the m.s. "Narragansett" she has in every way in service come up to the highest expectations of her owners and builders, and has fully justified Barrow's confidence in heavy-oil-engines for marine propulsion.
>
> "There is no misinterpreting the significance. The heavy-oil engine is bound, sooner or later, to play a large part in the expansion of the ocean-borne trade of the world. The Anglo-American Oil Company are therefore to be congratulated upon their public policy in adopting this most economical type of engine. They will doubtless reap a good reward in the decreased running cost of their ships."

In conclusion we will point out that the opinions of the Anglo-American Oil Company are also evidently borne by the British oil-company Tankers Ltd. as Vickers Ltd. are building four sister Diesel motor-tankers for this concern, and all will be duplicates of the "Narragansett" and "Seminole." Their yard numbers are 580, 581, 582 and 583. All six vessels are built on the Isherwood constructional system to Lloyds 100 A1 and their Diesel-engines are of the solid-injectiou type.

It is to be hoped that some of the principle oil-companies in the United States will follow the excellent lead set by these British-American oil companies—not overlooking the brilliant motorship development work of the Anglo-Saxon Petroleum Co.—and that they will co-operate more generously with "Motorship" in its work than they have done in the past.

Semi-Submerged Diesel-Driven Battle-Monitors

Noted Italian Engineer Advocates New Type of Vessel as Warship of the Future

DOUBTLESS inspired by the success of the British Diesel-driven M-class submarines with 12 in. guns, Nabor Soliani, a well-known Italian engineer, recently outlined a new class of motor-warship before the Italian Society of Naval Architects at Genoa. Unfortunately pressure on space has prevented our dealing with his paper prior to this. He outlined four classes of large high-powered Diesel-driven semi-submerged battle-monitors and one with turbines varying from 21,600 tons displacement, 24,000 H.P., 16.5 knots speed, to 22,600 tons displacement, 18,500 H.P., and 20 knots speed.

We give an illustration of what Signor Soliani's terms Type 3A, a vessel of 21,600 ton displacement, by 95 ft. breadth, 33 ft. depth and 29 ft., 9 in. normal draught. In this vessel it is intended to fit twelve-cylinder Diesel engines driving quadruple screws, and apparently on each shaft there is a four-cylinder Diesel-engine driving high and low stage air-compressors, although why these should be on the same shafting as the main engines is not clear. The total power is 24,000 B.H.P. or 500 B.H.P. per cylinder, which to many may seem like a wild dream; but, now being constructed in Europe for the Japanese Navy are a number of submarine Diesel-engines of 4,000 B.H.P. in eight cylinders. Six of them would produce the desired horse-power with 48 cylinders, or the same cylinder out-put as the engines in Signor Soliani's battle monitors.

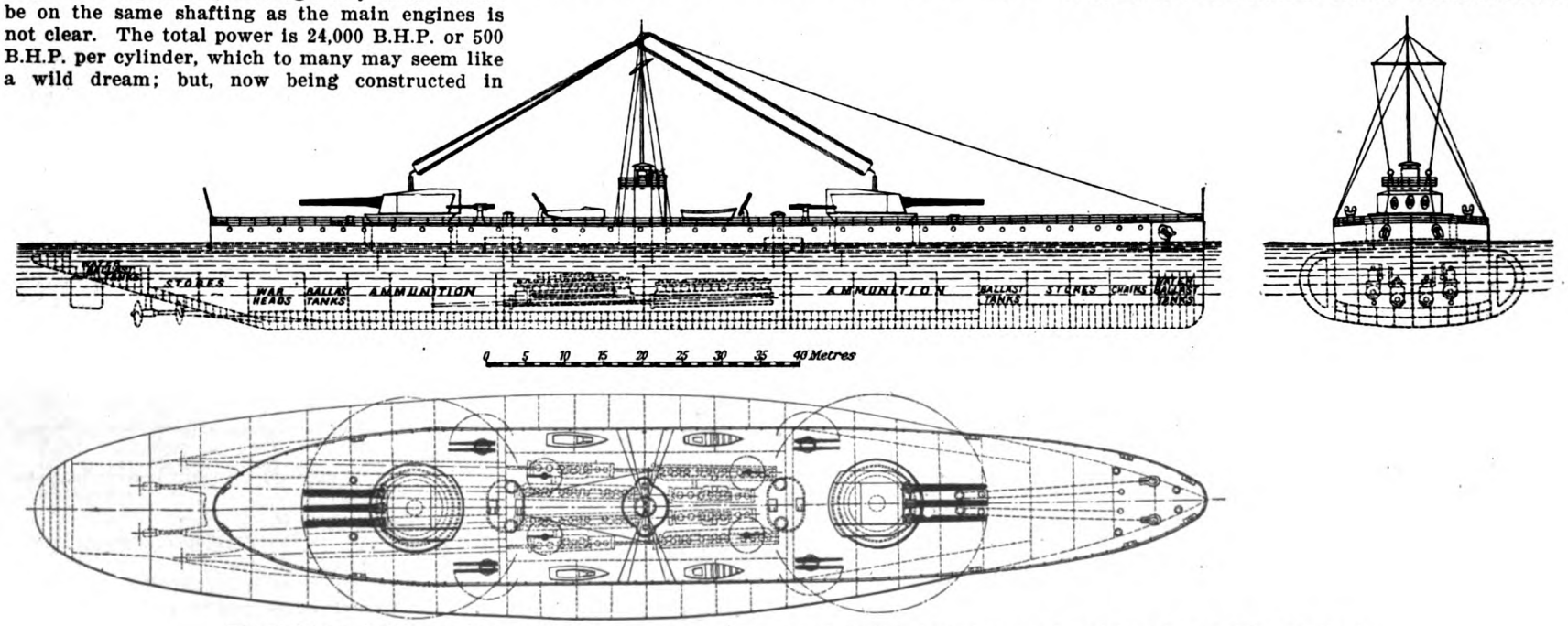
The main armament consists of six 381 mm. guns and eight 120 mm. guns in two triple-turrets. Two 102 mm. anti-aircraft guns are also carried. He has excluded torpedo-tubes as being inefficacious with larger ships. The main protection consists of a 15 in. belt.

The designer has endeavored to get over this in the type 3A by means of upper-works above the water, provided with cork filling, by which the reserve is sensibly increased. This superstructure, which he terms "a raft," even if it were completely destroyed, would not materially effect the stability of the vessel, as there would still remain a positive stability of weights. It has besides the following advantages:

1. It sensibly increases the reserve-buoyancy.
2. It renders the ship more habitable.
3. It increases protection against aerial attack.
4. It allows using the guns even in a rough sea.

The reserve of buoyancy, which in the type 3B having no upper works is hardly 900 tons, increases in the type 3A with 120 tons of cork to 1,500 tons, and this could be further increased by increasing the cork filling, which in the type 3A has only a volume of 600 cub. m. and occupies only the eighth part of the upper works. The latter, of course, are divided into watertight compartments to increase the buoyancy of the ship independently of the cork.

All points considered the type 3A appears to the designer to be the least defective. The idea of the



Diesel-driven battle-monitor of 21,600 tons displacement and 24,000 shaft h.p., designed by Signor **Nabor Soliani**

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New German Motorship "Lisa"

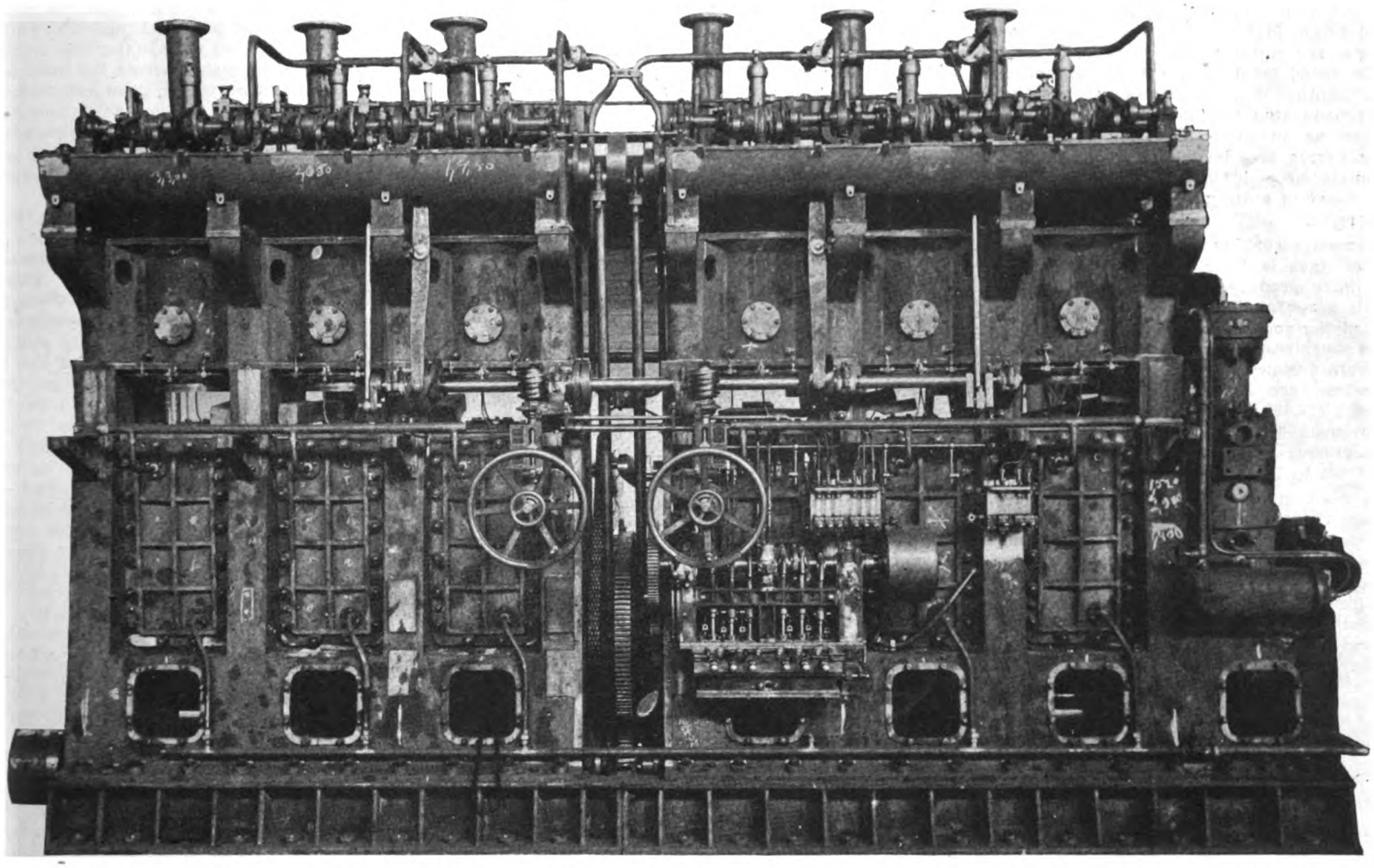
A Fourteen-Hundred Tons D.W.C. Vessel Propelled by Holeby-Diesel Engines Runs Trials

WHEN our Motorship Year-Book is published we believe our readers will be surprised at the large number of motorships now under construction in Europe and in the U. S. A., especially in Germany where rapid strides are now being made. This Year-Book's biggest feature will be a complete list of every motorship of note in service and under construction, with dimensions, etc., will be included.

Speaking of new German craft, a small motorship—the "Lisa" has recently carried-out sea-trials, the same being run in the firth of Flensburg, on Jan. 11th last. She was originally laid-down as a steamship, but during construction her owners wisely decided to install a Diesel-engine instead of steam-engines and boilers. This vessel has the following dimenions:

Deadweight Capacity	1,400 tons
Power	500 Ind. H.P. (350 shaft h.p.)
Engine-Speed	230 R.P.M.
Propeller	2,080 mm. dia.
Pr. Shaft diameter	175 mm.
Crankshaft Diameter	195 mm.
Length B.P.	72 m. 6 mm.
Breadth O. F.	8 m. 49 mm.
Depth	5 m.
Fuel-capacity	90 tons

The main Diesel-engine was built by the Holeby Engine Works, Aarhus, Denmark, and is of 500 i.h.p. and is similar in design to the larger Holeby engines of the tanker "Mexico" described in our issue of January last and illustrated in our issue of March, 1920. For auxiliary purposes there is a twin-cylinder 30 b.h.p. Diesel-engine driving a spare air-compressor, through a friction-clutch, also a bilge-pump by means of a belt drive. On tests in the factory the main engine showed a fuel-consumption of 72 kg. per hour.



Holeby 500 i.h.p. (350 shaft h.p.) reversible, four-cycle Diesel engine of the motorship "Lisa." It is the lowest-powered crosshead-type merchant marine Diesel-engine built. The method of actuating the cam-shaft is similar to the well-known Werkspoor system of long pull-rods and cranks

Shipping Board's Duty to Convert Steamers to Diesel Power

Extract from Frank C. Munson's Speech at National Marine League Banquet—President, Munson Steamship Line, New York

"AMERICAN shipowners have among their first considerations the necessity for placing themselves always in competition with the other steamship operators throughout the world. They must follow the market; their tonnage cost must be low; they must take whatever rates are necessary, both as to freight and passengers in order to maintain their position and prevent the competitor taking their business.

"The U. S. Shipping Board has been and is faced with the same problem, but during the first eighteen months after the Armistice there was a high-freight market as an aftermath of the war, and so the Government was able to make a profit, even with inefficient operators and ships running in the majority of cases with part cargoes. This entire situation has changed in the last six months, due to the law of supply and demand, and the fact that Europe in its distressed condition cannot buy our products as she did before the war. The rates of freight are down today to a very low basis, barely covering the operating cost in a great number of trades.

"All of us agree that the Government-owned property should pass into the hands of private interests as speedily as possible. Immediate action is necessary on this matter, because the only government operating ships today is the U. S. Government, and so long as the Government continues to be an owner it is interfering with the operations of privately-owned lines and with the shipbuilding industry. Owners are afraid to place orders for new ships because they do not know what the sales-policy of the Shipping Board will be. The delay therefore is causing a serious prejudice to two of the great industries of the United States and its influence is felt among the basic industries, such as the production of steel.

"During the war all of the ships of 7,000 tons and under were constructed with larger engines and boilers to drive them through the water than would ordinarily have been considered practical, but this was done in order to drive them through the water and get them away from the submarines. These ships are high consumers of fuel and, in my judgment, they must be modernized before they will be readily marketable.

"It is the duty of the Shipping Board to change the reciprocating type of engines and the water-tube boilers and put in Diesel motor, or Diesel-electric drive, or other modern and economical type of propulsion. The American operator cannot hope to compete with the foreign operators with the fuel-consumption and the loss of cargo space taken by the engines in these ships if they are handicapped in this way.

"We are a great producing country. We have proven beyond peradventure our ability to manufacture, for example, motor-cars in competition with all the manufacturers of the world. If we could arrive at such a wonderful stage in the motor development, it is certainly possible that American initiative, brains and inventive genius may, with proper encouragement and stimulation, arrive at a more remarkable stage in ship and Diesel-engine production."

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First Details of New Burmeister and Wain Engine for Single-Screw Motorships

Long Stroke Diesel Motor with Piston Removable From Below.

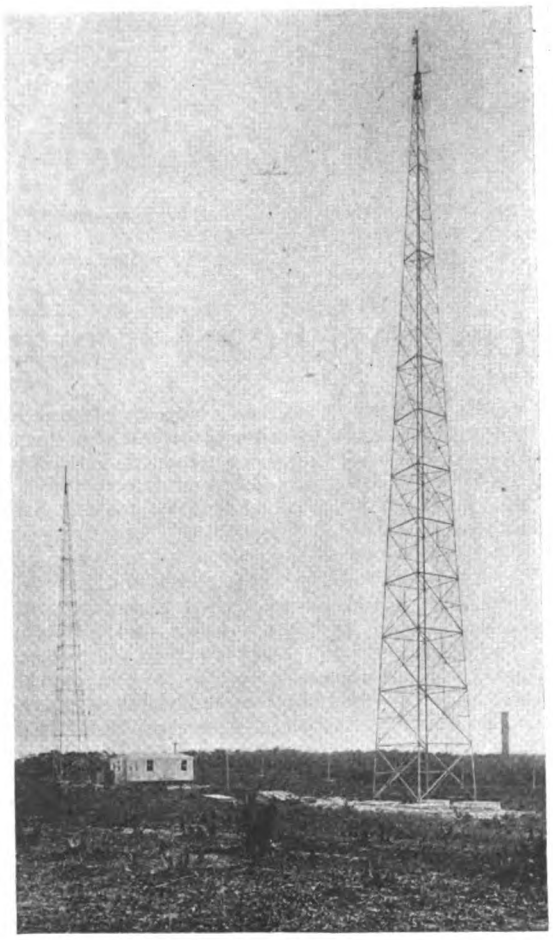
(Contributed)

SINCE the advent of the marine Diesel oil-engine, engineers and designers have endeavored to produce a motorship with a single propeller, particularly in the case of vessels of about 4,000 tons d.w.c. In a vessel of this size the height between the tank top and the deck does not permit the installation of twin slow-speed engines and for the power of the engines to be sufficient they must be of the high-speed type, in which case the propeller-efficiency is considerably lowered. Twin motors also leave insufficient room at the sides for auxiliary motors, compressors, etc.

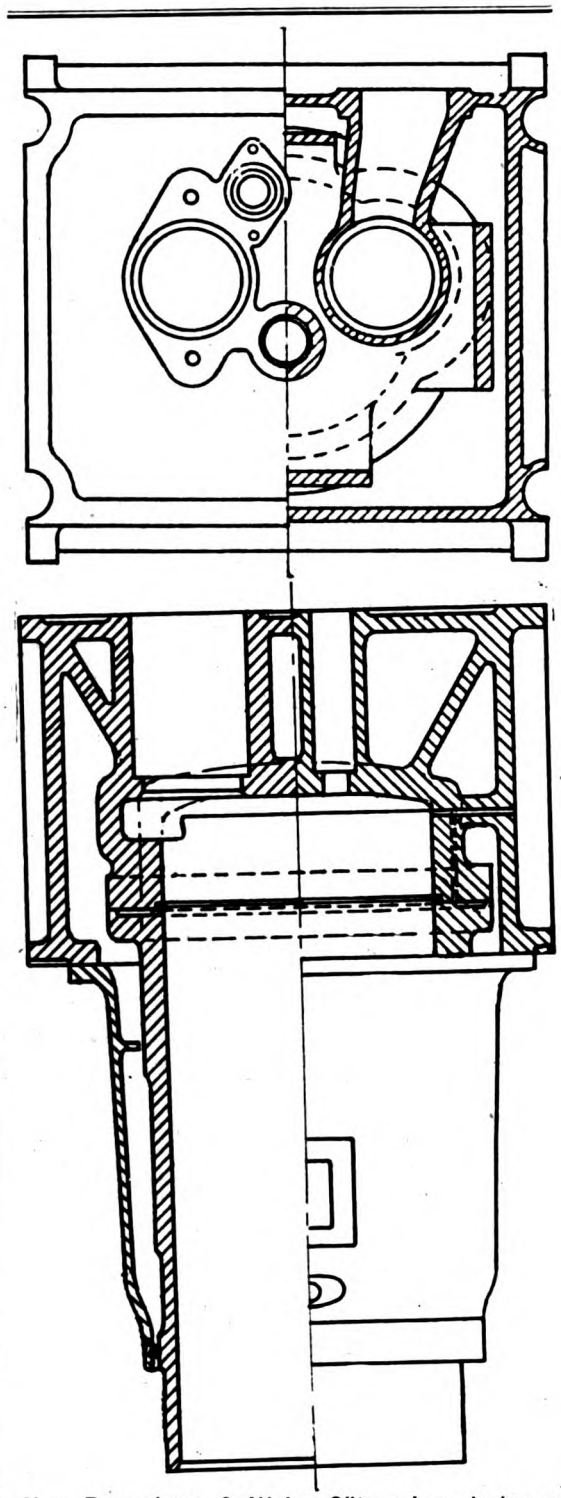
Several years ago shipbuilding companies installed single four-cycle motors in ships, but the type was not suited to the purpose, being rather high in speed for driving a single propeller. Recently another English company brought forth an opposed-piston solid-injection motor for single installations in motorships. Busch-Sulzer and Sulzer Freres are developing a two-cycle motor for single propeller installations, and stand a good chance of putting out a machine adapted for this service.

A company working on this problem along very sensible lines is Burmeister and Wain, who already have produced a four-cycle Diesel engine for this purpose. The R.P.M. have been lowered to 90, giving good propeller-efficiency. This motor differs considerably from the standard Burmeister and Wain design for about the same power. The dimensions are I.H.P. 1750; cylinder diameter 630 mm.; (24.803 in.) stroke 1300 mm.; (51.181 in.) revolutions 100; length from aft coupling to front of compressor 10,500 mm.; height from center of crankshaft to top of valves 6600 mm.

The most interesting features of this new engine are the cylinder head and liner. The heads are nearly square and are supported by distance pieces which stand on the "A" frames. The heads are bolted together, three and three. Long bolts pass from the main frame, thro the "A" frames and distance pieces, and between the heads, each nut pressing down on two heads. The long bolts also have nuts at the top of the "A" frames. The



Cutting & Washington Wireless station at East Hampton, L. I.



New Burmeister & Wain—Götaverken design of cylinder and cylinder head of their long-stroke Diesel-engine for single-screw motorships

liners are bolted directly to the head, without any packing, iron to iron. Outside the liner, bolted to the head with a gasket is the water-jacket, which packs off against the liner near the lower end with a rubber ring. This allows the liner perfect freedom to expand. The inner shell of the cylinder-head is well braced by four stays. The cooling-water enters at the lower end of the jacket and most of it is made to pass into the cylinder-head at the opposite side by a baffle-ring inside the jacket. The water space in the head is very large, insuring effective cooling around all valves.

The construction may be criticized by some engineers because the piston must be removed downward for inspection. In the ship it requires too much work to take it out through the top. In order that the removal of the piston downward may not be too complicated, it has been made oil-cooled instead of water-cooled. The construction of the piston as well as its oil-cooled feature seems to be the controversial feature of the design of the engine.

To remove the piston, it is brought almost to top center, the crosshead shoe is blocked-up, the crosshead bearings taken apart, and the connecting-rod lowered by turning the crank almost to bottom center while lowering the upper end of the connecting-rod with a chain hoist, so that it rests on the outboard side of the main frame. The outlet and inlet valves are removed, eyebolts screwed into the piston head, and the piston is lowered through the top plate so that the cross-head pin rests on beams placed across the main frame. It can then be inspected or even removed. The top plate differs from the ordinary construction in that it has a hole large enough to permit passage of the piston, this hole being closed by two semi-circular plates, which contain a scrape-ring for the piston rod.

The frame for the gear-train stands in the center but is separate from the "A" frames. The three fore and the three aft cylinder heads are bolted together with horizontal bolts. This construction allows the engine to weave slightly, too great rigidity having been found detrimental.

The main frame and "A" frame are largely of "I" section. The air-compressor is of the latest Burmeister and Wain three-stage design, directly connected to the crank-shaft at its forward end having its own base frame bolted to the main frame, though its "A" frame and cylinders stand free. Other parts of the motor are in general Burmeister and Wain standard, with such small refinements as experience has made desirable.

A motorship with this engine has three auxiliary Diesel motors. Two are of Burmeister and Wain standard type of 75 b.h.p. at 325 r.p.m. The third is a single-cylinder four-cycle engine, cylinder diameter 310 mm., stroke 350 mm., r.p.m. 400 and of 50 b.h.p. This has its head and liner of the same general design as the large motor, though the head and liner are cast integral which feature, while not new, has for the first time been adopted with B. & W. engines. The maneuvering air-compressor has three stages, and in case the main engine compressor fails, can supply sufficient spray air to operate the main engine.

In this engine and auxiliaries the Burmeister and Wain Company has brought forth a four-cycle single-screw motorship installation which is well in keeping with its former standard of excellence. This new design is being followed by the Götaverken for several single-screw freighters for which they are building engines.

EASTHAMPTON MARINE RADIO STATION

Telephone conversations half-way around the world, the navigation of ships, the direction of the movement of airplanes from a central station, the communication with submerged submarines—all by means of Radio, presages wonderful achievements yet to come.

Alive to the practical needs the Cutting and Washington Radio Corporation recently opened up a new commercial Radio Coastal Station at Easthampton, Long Island. The location of this station was the first important consideration for the Company's engineers and Easthampton was decided upon only after most careful study of the necessities of ships entering and leaving New York. The location of the Radio Station is on one of the highest knolls in the town about one mile from the shore. It occupies a plot of ground some six acres in extent. The two galvanized steel towers are three-hundred feet apart and are one-hundred and sixty-five feet high surmounted with wooden masts which bring the total height of the antenna to one-hundred and seventy-five feet above the heavy concrete foundations.

The station is the most complete and thoroughly equipped station of its kind in the country and will no doubt for some time to come occupy a leading position among commercial coastal radio-stations.

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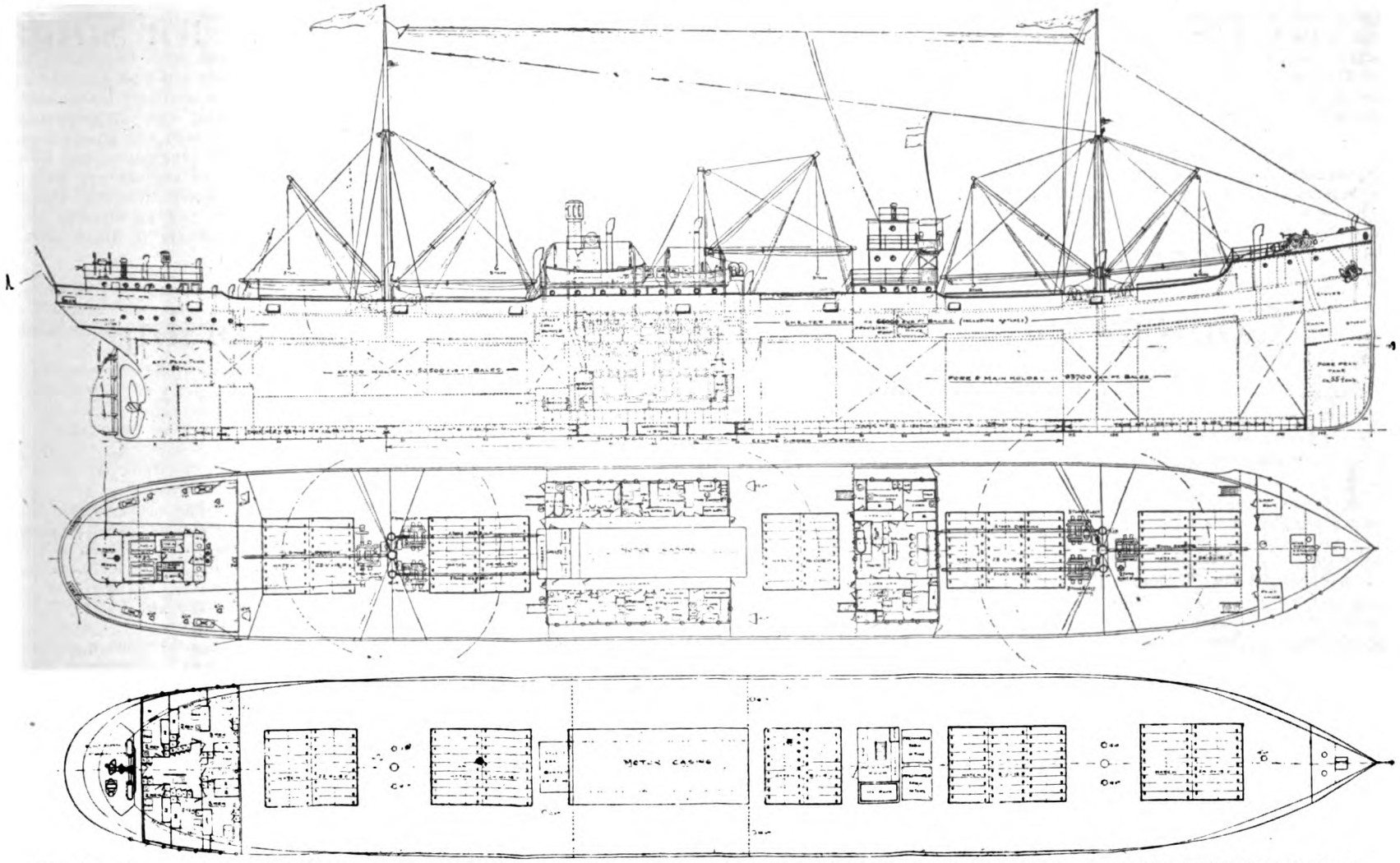


Single-screw motorship of 3,015 tons gross for Svenborg Steamship Co., now building at the Odense Shipyard. She is equipped with the new long-stroke Burmeister & Wain Diesel-engine described elsewhere in this issue

Motorships for Svenborg Steamship Co. and for Fred Olsen

Single-Screw Diesel-Ship of 3,015 Tons Gross With New Burmeister & Wain Slow-Speed Long-Stroke Engine—Also Two Small Motorships Building at Odense Shipyard with Trunk-Piston Engines

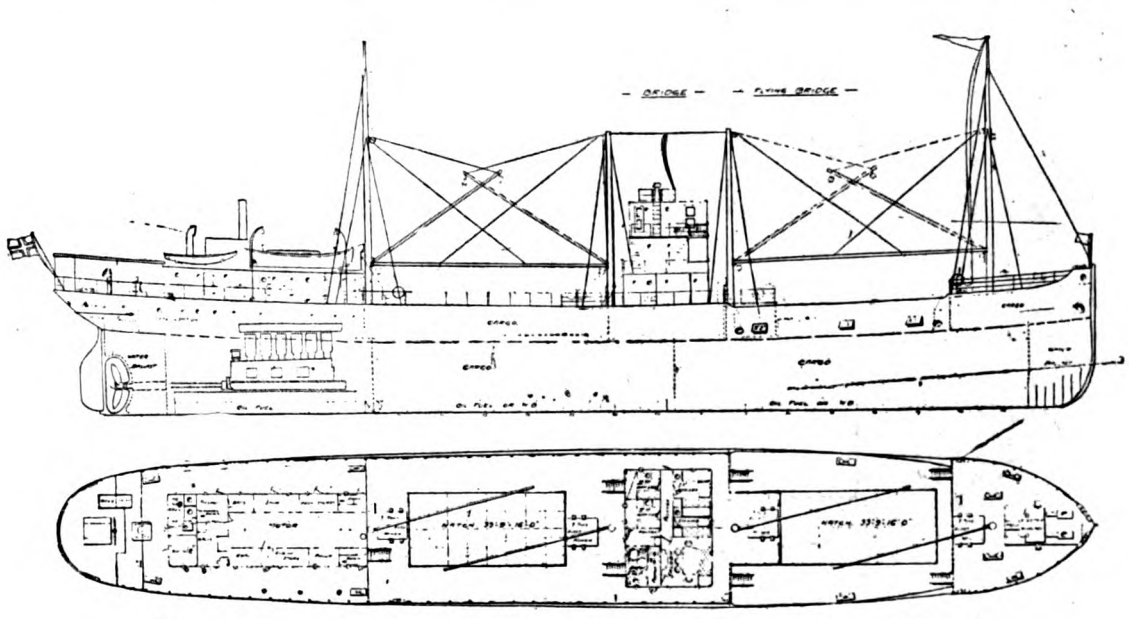
IN addition to numerous new large motorships building at other shipyards Fred Olsen the well-known Norwegian shipowner has two small twin-screw motorships under construction at the Odense shipyard, as stated in our January issue (page 31) in which the new trunk-piston type Burmeister & Wain Diesel-engine similar to that in the "Fritzoe" is being installed. At the same shipyard another interesting Diesel ship is being built, but to the order of the Svenborg Steamship Company. A new type of Burmeister & Wain engine is being installed in this vessel too—namely the long-stroke slow-speed motor specially designed for single-screw vessels, particularly for converting existing steamers to internal-combustion power. It was built at Copenhagen. Reference has previously been made to this design in our columns and drawings and details of the engine are given elsewhere in this issue. The vessel has the following dimensions:

Dead-weight capacity	about 4,500 tons
Gross Tonnage	3,015 tons
Net Tonnage	1,800 tons
Length O. A.	315 ft., 3 in.
Length B. P.	301 ft.
Breadth Md.	44 ft.
Depth to S. D.	28 ft., 11 in.
Depth to U. D.	21 ft., 11 in.
Draught	22 ft.
Cubic-Capacity (Bales)	210,000 ft.
Cubic-Capacity (Grain)	230,000 ft.
Fuel-Capacity	580 tons
Water Ballast (d. b. & P. t.)	771 tons
Power	1,500 i.h.p.
Engine & Propeller Speed	85 R.P.M.
Bore & Stroke	24.803 in., 51.181 in.
Ship's Speed (Loaded)	10 knots
Propeller	Four Blades, Solid Manganese-Bronze
Registry	British Lloyds 100 A1

For auxiliary machinery power there are three four-cycle twin-cylinder B. & W. Diesel engines, 11.60 in. bore by 13.77 in. stroke, each direct-connected to an electric-generator. Two sets are used in port, one being a stand-by. There is an oil-fired donkey-boiler for steam heating the ship. In the engine-room the day fuel-tanks contain sufficient oil for 12 hrs. running.

Midships on the shelter-deck there is a deckhouse, with saloon, two passenger-cabins, hospital, cabins for steward and pilot, and a pantry, bath, etc. Above on the bridge-deck is a deckhouse with cabins for the captain and the wireless-operator, and above again the charthouse with navigation-room and the wireless-room, is on the flying-bridge. On the side of the engine-casing the accommodation of the deck and engine officers are to be found, as well as their mess and the cabins for the cook and the boys and pantry and bath. Below the shelter-deck aft the accommodation for the crew is arranged with cabins for two and three men. Above the shelterdeck is a deckhouse with a mess for the men and a mess for the engineers, bath and entry to the cabins.

The vessel is fitted with two masts with out-



Plans of small motorships building for Fred Olsen at the Odense Shipyard

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riggers and samsonpost, there being in all 7 derricks and 5 hatchways. Her deck machinery is electric, and comprises a windlass and seven 3-ton Thomas B. Thriges winches. The steering-gear is of the electric-hydraulic type. Electric-light is fitted throughout.

The Two Small Motorships

Regarding the two small single-screw motorships just referred to as being building at the same yard to the order of Fred Olsen of Christiania, Norway, these will both have a dead-weight capacity of 1,350 tons and are being built to the Norwegian Veritas 1A1. Their dimensions are as follows:

Dead-weight-capacity	1,350 tons
Cubic-capacity (grain)	89,200 ft.
Cubic-capacity (bales)	75,500 ft.
Fuel-capacity	311½ tons
Power	900 i.h.p.
Engine Speed	130 R.P.M.
Ship's Speed	10 knots
Length O. A.	227 ft.
Length B. P.	215 ft.
Breadth Md.	34 ft., 6 in.
Depth to U. D.	15 ft.
Height of forecastle	7 ft., 6 in.
Draught	14 ft.
Gross Tonnage	950 tons

These vessels are rigged with two masts and two samson-posts and there are four derricks and two large hatches. All the auxiliary machinery is Diesel-electric, there being two single-cylinder Diesel-engines of the same bore and stroke as the three twin-cylinder B. & W. engines in the larger ship just described. These engines are coupled to generators and furnish current for four Thomas B. Thrige electric-winches and an electric steering-gear. One of the lifeboats is fitted with a motor.

Comparison of Steamship With Sister Motorship Now Building

Drawings Show Large Gain in Cargo Space in Favor of Diesel Propulsion—Both Single-Screw Vessels

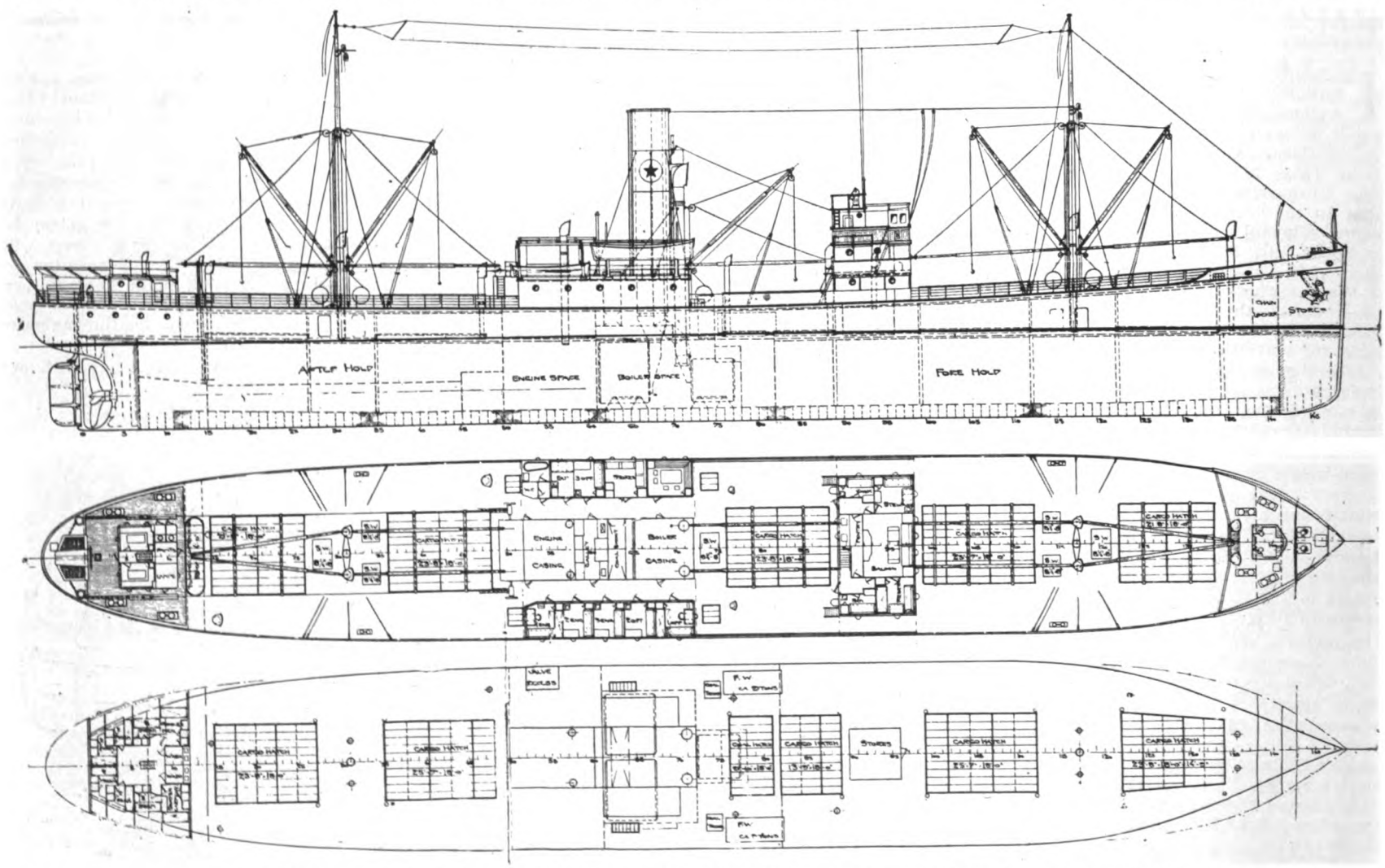
HITHERTO Swedish merchant-ship Diesel-engine builders have been limited to the Götaverken and the Atlas-Polar Works, but lately other shipyards have taken an active interest in motorships, this having been stimulated by their having had the hulls only to build, the motors having previously been supplied by other firms which, of course, has left their own boiler and steam-engine shops more or less slack, but has had the advantage of enabling them to personally see the savings in space and weight to be gained by utilizing internal-combustion power. Thus the motorships themselves have been good educational factors.

The Eriksbergs Mek Verkstads Aktiebolaget, of Göteborg, is one of the most recent comers into this new field, and now under construction at their shipyard is a new Diesel-engine machine-shop for building and repairs. Their new 15,000 tons d.w. floating-dock will be ready by the time this appears in print.

This firm is now building a single-screw motorship of their standard closed shelter-deck type, which design of hulls have previously been fitted with steam reciprocating-engines and boilers, whereas the new hull—which is for the Swedish Lloyd—will have a four-cycle Götaverken-built Burmeister & Wain Diesel engine of the slow-speed, long-stroke type. Later motorships will be Diesel-engined by themselves.

Through the courtesy of the Eriksberg Shipyard we are enabled to produce the drawings of this motorship and drawings of the steamship "Hibernia," also owned by the Swedish Lloyd and built by them, and it will be seen that the installation is heavily in favor of the Diesel power even though many of the motorships' detailed figures are not yet available. The following are some interesting comparisons between the two vessels:

	Swedish Lloyds S.S. "Hibernia"	Swedish Lloyds Motorship
Deadweight capacity	3,750 tons	3,750 tons
Net cargo-capacity on round trans-atlantic voyage	3,000 tons	3,425 tons
Length O. A.	302 ft. 10 in.	302 ft. 10 in.
Length B. P.	292 ft.	292 ft.
Breadth M. D.	43 ft.	43 ft.
Depth M. D.	19 ft.	19 ft.
Depth to S. D.	26 ft.	26 ft.
Draught	19 ft. 9¼ in.	.....
Power (indicated)	1,300 h.p.	1,600 h.p.
Power (effective)	1,150 h.p.	1,200 h.p.
Engine's speed	———	95 r.p.m.
Ship's speed (loaded),	10½ knots	10½ knots
Cyl. bore and stroke,	22-7/16x35-7/16x58½x36 in.	6-25x51 in.
Daily fuel-consumption,	22 tons (coal)	5½ tons(oil)
Bunker capacity	605 tons	.....
Fuel required on round transatlantic voyage (incl. port)	555 tons	185 tons
Cruising radius,	6,700 nau. miles	7,200 to 25,000 nau. miles



Steamship "Hibernia" built at the Eriksberg Yard for the Swedish Lloyd. She has the same overall dimensions as the motorship this yard (illustrated on next page) is now completing for the same shipowners. The great difference in the cargo capacity is worthy of special note

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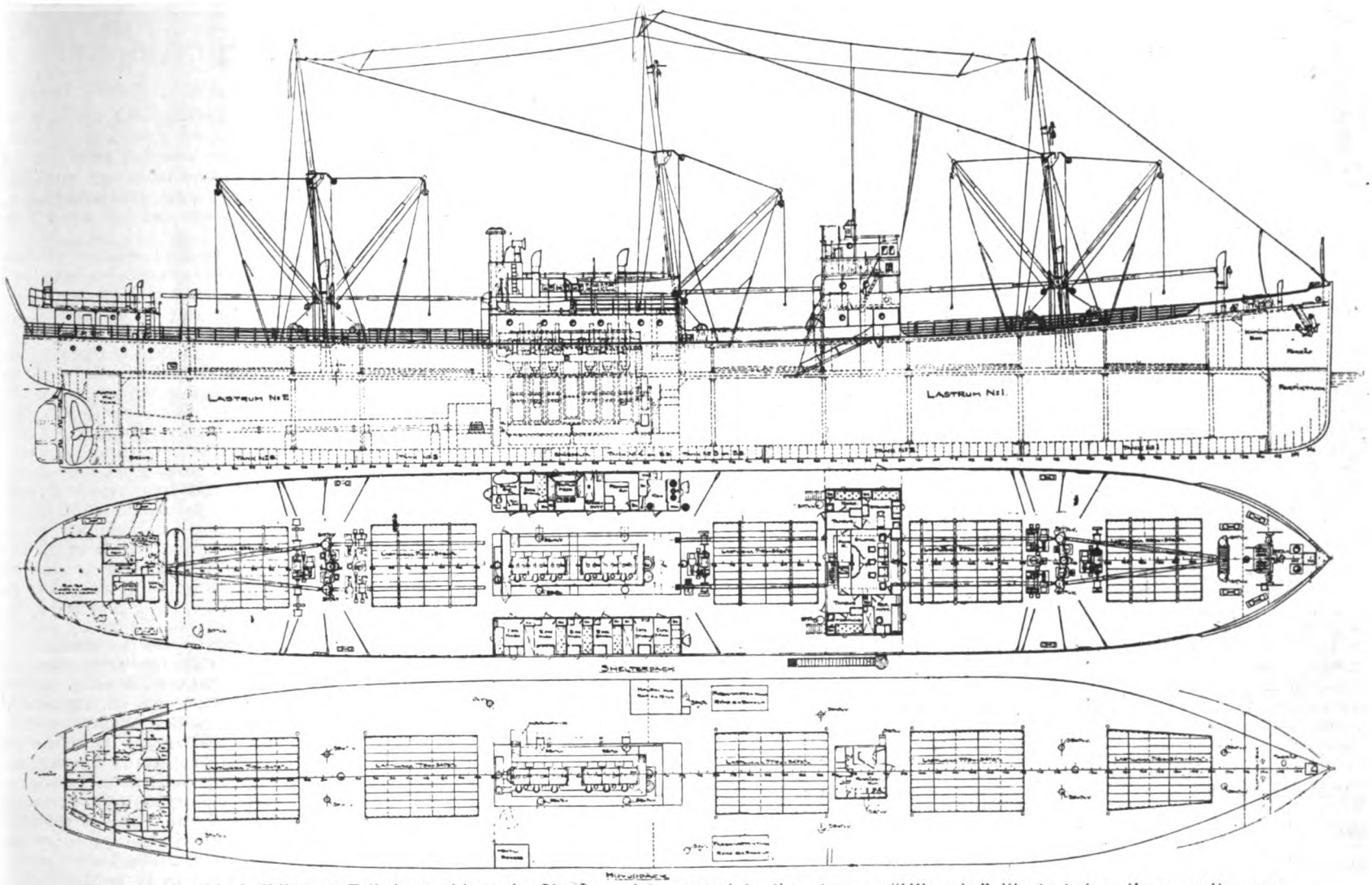


Diesel motorship building at Eriksburg shipyard. She is a sister vessel to the steamer "Hibernia," illustrated on the opposite page

Cubic cargo-capacity (grain)	186,430 ft.	200,000 ft. (about)
Cubic cargo-capacity (bales)	173,200 ft.	190,000 ft. (about)
Machinery space,	28 frame-spaces	22 frame-spaces
Length of machinery space	54 ft. 6 in.	42 ft. 6 in.

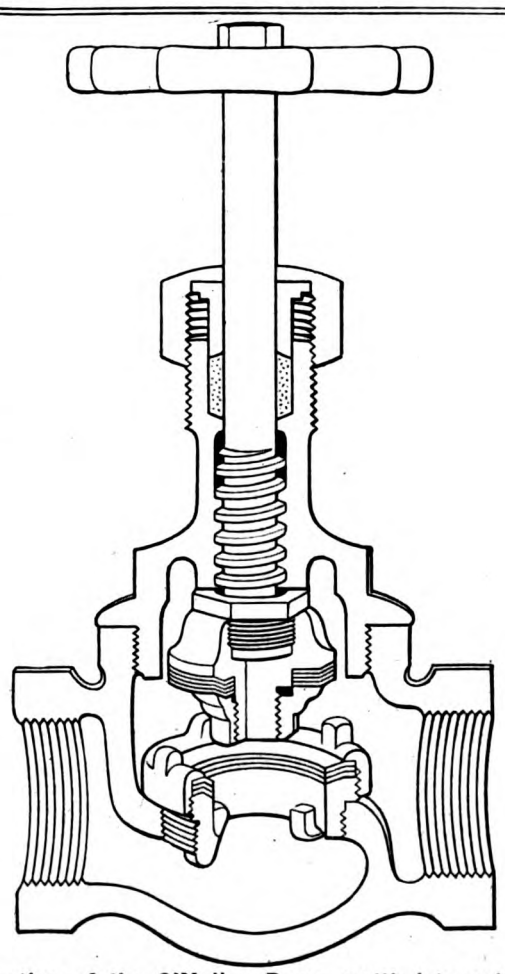
In the first place the engine-room of the new motorship is 42 ft. 6 in. long compared to the 54 ft. 6 in. length occupied by the steam-engines and boilers of the steamer "Hibernia," or 62 ft. 9 in. length if the latter's bunkers are taken into consideration, which they should be as the fuel of the motorship is carried in the double-bottoms. Here is a gain of a total of 20 ft. 3 in. of cargo space in the best part of the ship. Furthermore, this particular make of Diesel-engine is somewhat longer and heavier than many other equally well-known Diesel-engines, so the big saving in space here made is not an exception.

The motorship will only fuel at the United States end of the voyage, whereas the S.S. "Hibernia" has to coal at both ends, but the latter burns about 355 tons on the 3,600-mile run from Sweden to New York, assuming an average of about 16 days, and also will burn about 100 tons in port at each end.

On the other hand, the motorship will only require about 175 tons on the 7,200 naut. miles round-voyage, and will use less than ten tons of the fuel-oil during each two-week stay in port, so a total of 200 to 250 tons of oil in her double-bottom bunkers will be ample, unless she is desired to carry a larger amount from New York to Göteborg and sell the balance as cargo in Sweden.

If the S.S. "Hibernia" was oil-fired instead of coal-burning she would need a total of 725 to 800 tons of fuel in her bunkers for the round-voyage and two weeks' port-consumption at each end. So it will be seen that regardless of the class of fuel a steamship burns, the motorship has the benefit of a large gain in cargo-space and weight, without even counting the gain of at least 100 tons of fresh-water that a steamer of this size must carry for use in her boilers. Then, of course, there is the absence of firemen to be considered. Also, as no fires have to be drawn, etc., there is no drop in speed when one watch gets tired, or fluctuations with the change of watch, dirty tribes, and propeller racing in rough weather.

This new motorship for the Swedish Lloyd (Moore & McCormack, New York Agents) has accommodation for her officers in the housing amidships, except that the chief-engineer's cabin is placed in a separate house between the second and third hatches. The crew's space is aft. There are two holds and five large hatches. In the engine-room the auxiliary machinery consists of three Diesel-driven electric-generators furnishing current for the steering-gear, winches, windlass and one spare air-compressor. For heating purposes there is a small oil-fired donkey-boiler and this also provides steam for a small auxiliary air-compressor.



Section of the O'Malley Beare multi-plate valve

A MULTI-SEAT VALVE

Reference was made in our February issue to a valve of a special type which we consider very suitable for Diesel-engine and merchant-motorship installation work, and which we recently saw at the head-offices of the O'Malley Beare Valve Co., 80 East Jackson Boulevard, Chicago, Ill., U.S.A. As will be seen by the accompanying sketch, the valve has two series of multiplates of thin metal, one series on the valve-head and the other on the seat. These plates are detachable, so that as each becomes worn and pitted, it can quickly be detached, but a true seating remains. After all the plates are gone, and if no further supplies are available, there still remains the main head and seat both ground to a tight fit. These plates are made in different kinds of metal and of varying hardnesses in order to suit various classes of duties.

Removal of the plates is a simple process. This operation consists of unscrewing the bonnet from the valve-body, whereupon the disc-plates are made accessible by removing the disc-nut on the end of the valve-stem. The master seat in this valve being removable, is then unscrewed from the valve-body by inserting a special box-wrench between the lugs provided on the inner surface of the nut, unscrewing the retaining-ring from the master seat as one would a nut, after which the metal plates on the seat are made accessible by unscrewing the retaining-ring on the master seat. To provide for contingencies when the plates are gone, the master seat is properly shaped as just mentioned.

While we are without authority to make a definite statement, we believe that a specimen valve would be sent to any responsible engineering or shipbuilding firm communicating with Mr. G. A. McLean of the above company and referring to "Motorship."

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Electricity Applied to Ship Auxiliaries

Extract from Paper Presented at the Joint Meeting of the N. Y. Section of the American Institute of Electrical Engineers and the Metropolitan Section of the American Society of Mechanical Engineers, New York

BY H. L. HIBBARD

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THE advent of the fuel-oil engine-driven ship has marked a great stepping stone in the adoption of electric power, particularly for auxiliary purposes.

At the present time there are quite a number of oil-engine driven cargo-vessels with electrical auxiliaries and others with electric drive and electrical auxiliaries being constructed and projected in this country, and in the opinion of certain editorial writers, the outlook was never more favorable in this country, particularly for construction of oil-engine driven vessels, than at the present time. Motorships are now under construction for the American-Hawaiian S. S. Co., the U. S. Shipping Board, the Standard Oil Co., the Alaskan S. S. Co. and the Submarine Boat Corporation, and quite a number more are under contemplation for this year.

In the selection of the generating plant for the electrically-operated vessel, considerable thought is necessary as to the number and size of the units to be installed. A number for instance, of the Burmeister and Wain vessels have three 60-kw. machines, 230-volt; the English vessel *La Paz* has three 100-kw., 230-volt, the American tanker *Solitaire* has three 45 kw. and one 10-kw., 230-volt; the *Cubore* is provided with three 100 kw., 250-volt sets. The aim is in general to provide an equipment which is sufficiently flexible to permit of the operating of all auxiliaries and lights with one machine when cruising and to operate the vessels while handling cargo in port with two machines, or under possible extreme emergency conditions three machines, one machine being however in practically all cases considered as a spare. Much division of opinion exists, however, as to the wisdom of going to as many as three units, some claiming a preference for two units of larger size.

These installations have in general provided two wire d-c. system and such vessels as the *La Paz* and *Solitaire* have furnished lights at 230 volts. Generally satisfactory results are reported from the *Solitaire* for lamps of this high voltage with the exception of the small instrument lamps which are frequently broken. The officers of the *La Paz* reported frequent breakage and rather unsatisfactory results. A practise which has been followed by the Burmeister and Wain Co. and has found general favor amongst engineers in this country also, is the use of a small motor generator set for reducing the 230 volts of the generators to 110 or 115 volts for the lamps and providing this small machine with sufficient flywheel effect also to smooth out any pulsations from the auxiliary oil engines and fluctuation of voltage due to sudden changes of loads on the generators. 110 volt lamps are furthermore in addition to being mechanically stronger, more universally obtainable.

Direct Current versus Alternating. A few years ago a considerable controversy existed between engineers as to the advisability of the use of alternating and direct current on shipboard, and as previously outlined in 1916 to 1917 a number of vessels were constructed in this country, including vessels of the cargo and tanker type, which had a-c. equipment. It was contended by some at that time that direct current was impracticable particularly for tanker vessels, owing to the danger of igniting inflammable gasses by sparks moving from contacts, etc. We believe, however, that later developments have quite clearly disposed of these contentions and shown the wisdom of providing in general, for auxiliary equipments on shipboard, the d-c. system; and we understand that some of the vessels which were constructed in 1916 and 1917 with the a-c. outfits have not proved themselves nearly as satisfactory as d-c. installations. The direct current has a distinct and decided advantage in the flexibility and extent of speed control obtainable, and in the obtaining of speed and torque characteristics for hoisting apparatus such as deck winches, windlass and capstan, which can not be furnished by the a-c. motor. There is no advantage furthermore, on a vessel from the distribution stand-point, in the use of alternating transmission, and a 3 or 4-wire system is more expensive and complicated than the straight 2-wire d-c. distribution. We note that English authorities have recently appeared definitely in print to the above effect, recommending strongly also against the use of a voltage higher than 220 generally throughout the vessel.

With regard to tank vessels, it is possible to furnish motors entirely enclosed, gas and watertight, and where location renders the same desirable, to furnish forced ventilation through the enclosed motor cases. The experience of the Diesel tanker *Solitaire*, which was thus equipped, has been to date very satisfactory and two tankers, the *Watson* and *Hillman*, are being constructed with d-c. equipments on the Pacific Coast for the Standard Oil Co.

Various types of electrical apparatus, generators, motors and controllers are required for the electrical auxiliaries on board ship, according to their location, duty and general requirements, which are discussed in some detail.

For motorships oil-engine sets are naturally employed with generator mounted on a common bedplate and the fly wheel of suitable proportions to assist the regulation and smooth out the voltage fluctuations.

These sets are now in all cases furnished with open-type generators, but in many instances are protected by hoods or metal shields from drippings due to moisture condensation and throwing of oil.

Motors. For driving the various auxiliaries, motors of the open, ventilated or enclosed watertight type are employed, especially the two latter types as but few installations justify the use of entirely open motors.

For deck auxiliaries such as windlass and deck winches, entirely enclosed watertight motors are essential which must be made rugged and sufficiently watertight to withstand such submergence as is occasioned by heavy seas coming over the vessels. This condition therefore, practically necessitates the use of stuffing boxes or similar means around the motor shaft to exclude water and particular attention paid to the design of bearings to insure proper lubrication and operation under roll of the ship.

Some electric motors are provided with ball-bearings, which are coming into considerable favor for shipboard use to meet the particular conditions.

The operation of engine-room auxiliaries, such as pumps, compressors, etc., open or entirely enclosed watertight motors are occasionally employed but the ventilated type of motor finds particular favor for this purpose as it provides protection against drippings and at the same time permits the use of smaller motor frames for the same duty than when absolutely water-tight.

Controllers. As in the case of motors, several types of controllers are utilized, according to the installation conditions and duty to be performed. These consist of the panel, drum or contactor type, either open, enclosed non-watertight, or watertight.

For the operation of certain of the auxiliaries where watertight construction is not considered necessary but where it is desired to prevent unauthorized manipulation and render the controller drip-proof, a manually-operated panel with hinged doors provided with lock and key is employed, which shows a manually-operated starter and speed-regulator, especially suitable for the control of small motors.

Where watertight or gastight protection is desired, a manually-operated watertight panel type controller is frequently utilized. The motor starter and speed regulator is operated by control levers extending through stuffing-boxes in the front cover. Gum rubber gaskets with clamping devices are furnished to insure watertightness.

Particularly where installations are in somewhat inaccessible positions, automatic controllers operated by push-buttons now find great favor, as the buttons can be located in a very convenient location, and furthermore, the operation of starting the motor is automatic and taken out of the hands of the operator.

For deck machinery, such as winches, windlass, capstan, etc., a manually operated watertight drum is frequently employed which, owing to its watertight construction, can be mounted at the auxiliary above decks.

Centralized Control. A method of control of the auxiliaries, particularly on tank vessels, which has found favor in some quarters, mounts the control apparatus, except for the deck winches and windlass, all on a centralized control board in the main engine room. In the case of tankers this takes the controlling apparatus away from cargo-pumps, etc., where there is danger from explosive gases. With this arrangement automatic starting controllers are provided for each auxiliary at the board and with a push button station at the auxiliary, for signaling to the engineer to start the apparatus, and for stopping the apparatus at the auxiliary if desired. When the signal is received the operator at the switchboard closes the line switches or circuit breakers and the equipment is automatically started. Such an arrangement is installed on the motor-tanker *Solitaire*, and reports from officials of the Texas Co. indicate entire satisfaction with the arrangement.

In all shipboard work reliability is of the first importance and electrical apparatus for ship auxiliaries must be ruggedly constructed, yet at the same time need not be clumsy as we are frequently led to feel is the case with many of the European designs. Furthermore, each piece of electrical apparatus should be particularly designed for the service and conditions to be met. These conditions need to be carefully *studied* and too great emphasis cannot be laid on this point, as it is at the root of the successful operation of electrical machinery. Motors on deck will in many cases frequently be awash and hit by heavy seas, also, when the crew is washing down the deck the hose will often play over the motors. Vessels trading in tropical climates will have deck machinery subject to the excessive heat of the tropical sun and all vessels on northern routes have their deck motors at times subjected to very low temperatures. In the engine room leaky steam-pipes are a danger to the motors, and where Diesel engines are employed for the propelling machinery, thought should be given to the protection of motors and controllers from oil fumes and drippings.

(*To be continued in our April issue*)

LAUNCH OF 13,500 TONS D.W. MOTORSHIP "JAVA"

The East Asiatic Co.'s second 13,500 tons d.w.c. motorship was launched on January 24th at the Nakskov Shipyard, Nakskov, Denmark, and was named "Java." At the same shipyard the Diesel-tanker "Mexico" of 4,500 tons. d.w. and the Diesel freighter "Indien" of 8,800 tons d.w. was launched during 1920. At the present time three other Diesel motorships are on the ways, as previously announced in our columns. The dimensions of the "Java" are 440 feet length b.p. by 60 feet breadth by 42 feet depth. She is propelled by two Burmeister & Wain Diesel engines of 2,300 i.h.p. each.

MOTORSHIPS FOR CARRYING BARGES

A new type of Diesel-driven motorships has been designed in England for the purpose of transporting barges of 220 tons and 280 tons gross. The design is being developed by the International Barge Supply & Transport Co., Ltd., to the design of Mr. Robert McGregor, of Dibles, Ltd., Southampton, England. The motorship is of 850 tons d.w.c., with a length of 175 ft. by 28 ft. 9 in. breadth, and is intended to have a speed of 9½ knots on a 12-ft. draft. She is to be propelled by two Sulzer two-cycle type Diesel-engines of 300 shaft h.p. each. As the daily fuel consumption of this vessel will only be 2½ tons of oil per day, there will be sufficient fuel in the double bottom of the hull for a voyage of 18,000 nautical miles.

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Interesting Notes and News from Everywhere

RUSSIAN VOLUNTEER FLEET'S MOTORSHIP

The large Krupp Diesel-engined tanker "Baku," sister to the "Loki" and "Glenpool," is now owned by the Russian Volunteer Fleet.

CONCRETE MOTORSHIP "DURHAM" PASSES TESTS

The Bolinder-engined American concrete motorship "Durham" built for carrying oil in bulk for the France & Canada Transport Co. has passed the tests of the U. S. Steamboat inspectors and run her trials.

CONCRETE MOTORSHIP "FJELDBE" RUNS TRIALS

Trials of the concrete motorship "Fjeldbe," 570 tons d.w.c. 34,000 ft. cubic-capacity, have been run. She has been built at Moss, Norway, to the order of I. Sorensen, of Christiania, and is propelled by a 320 b.h.p. Bolinder surface-ignition oil-engine.

219 MOTORSHIPS OF 1,027,202 TONS D.W.C. IN ACTUAL CONSTRUCTION

On December 31 there were no fewer than 189 motorships of 454,502 gross tonnage (about 727,202 tons d.w.c.), upon which constructional work had actually been commenced, according to Lloyds Register recent report. Fifty-seven of these aggregating 227,001 tons gross (about 363,200 tons d.w.c.) are in British yards.

This does not include many motorships on order, upon which construction work had not actually commenced at the above date. Furthermore, these figures exclude Germany, where there are about 40 motorships aggregating over 300,000 tons d.w.c. now under construction or being converted from steam. This makes a total of vessels actually under construction, 219 of 1,027,202 tons d.w.c. approximate.

OUR REGISTRY OF MOTORSHIP'S ENGINEERS

Lieut. (j.g.) D. L. Trautman, graduate of Carnegie Institute of Technology and Electrical Engineering, qualified for submarine command, holds second Asst. marine engineer's license. Has had 8 years at sea in the U. S. Navy, the last two being as engineer and electrical officer in submarine service.

G. H. Pendleton.—Has had 12 years' experience with operation of marine gasoline, surface-ignition and Diesel engines. Has been with Allis-Chalmers in connection with erection work of steam and electrical equipment. Was Chief-Engineer on the Winton Diesel-engined motor-auxiliary "Sherewog." Also guarantee-engineer on Norwegian auxiliary "Ekstrand" of 680 tons net, powered with twin Fairbanks-Morse 60 b.h.p. oil-engines. Is member of M.E.B.A. No. 80, 15 Whitehall Street, New York.

L. Benjamin, 4213 Jerome Avenue, Woodhaven, L. I., N. Y.—Has unlimited license for motorships. Until recently was first assistant on the Diesel motorship "Brammel Point." Prior to that was second assistant on the Diesel motorship "Bayonne." Shop experience includes erection in the Southwark-Harris Diesel Works, Philadelphia, and at the De LaVergne Oil Engine Company's plant, New York. During the war was in the U. S. Navy in the engine-room of a motor patrol boat "Kemah" powered with twin 225 b.h.p. Southwark-Harris Diesel engines.

SIR CHARLES GREENWAY AND THE MOTORSHIP FIELD SITUATION

In a recent speech at the last general meeting of the Anglo-Persian Oil Co., Sir Charles Greenway, Bart., said that he agreed with Lord Pirrie as to the wastefulness of burning liquid-fuel under boilers, but he did not agree that shipowners should be so very cautious in ascertaining whether oil could be obtained for use in the internal-combustion engine in motorships in the near future because there was no ground for pessimism as to the future supplies of liquid-fuel. Sir Chas. Greenway said that the world's production of liquid-fuel is probably not more than 10,000,000 million tons to-day, after deducting the oil used by refineries and railroads. But that in the course of a few years' supplies from already proved fields will amount to fully 50,000,000 tons per annum, or equivalent for burning in Diesel-engines of 175,000,000 tons of coal.

EAGLE OIL OFFICIAL PARTLY CONVERTED

Speaking in the behalf of the Eagle Oil Transport Co. Mr. R. P. Brousson said that—"he thought the future on the seas rested largely with the Diesel ship, but not entirely, as hand-in-hand with the Diesel-ship would be the turbine-ship." Belief in the motorship is a gradual one produced only by results, but it will be noted that Mr. Brousson is half-way converted. In another year or two he will be a full-fledged Diesel enthusiast. Mr. Andrew Laing replying to Mr. Brousson stated that the Eagle Co., had displayed great courage in going-in for geared-turbines. We would say they certainly did!

BALTIC-AMERICAN LINE MAY HAVE MOTORSHIPS

It is possible that two 15,000 tons d.w.c. Diesel motorships may be allotted by the East Asiatic Company to the Baltic-American Line for its new freight and passenger service from Hamburg, Danzig, Libau to New York. The Baltic-American Line is a subsidiary of the East Asiatic Co. of Copenhagen.

MOTOR TANKER FOR ANGLO-PERSIAN OIL CO.

A small motor-tanker to be propelled by one 180 b.h.p. Kromhout surface-ignition oil-engine is now under construction at the West Lynn Shipyard of the Kings Lynn Ship Co., England. The vessel is 147 ft. long. Steam for steam-heating coils in the cargo tanks will be supplied by an oil-fired boiler. She is for the Anglo-Persian Oil Co.

INTERNATIONAL MONEY-ORDER RATES

For the benefit of our readers and advertisers overseas, we will mention that, according to a recent ruling by Postmaster-General Burleson, Washington, D.C., U.S.A., the following new conversion rates on international money orders were made effective on February 15, 1921:

Great Britain, pound, $4.00.
Netherlands, florin, 35 cents.
Sweden, krona, 24 cents.
Denmark, krona, 20 cents.
Norway, krona, 20 cents.
France, 13 francs, $1.00.
Belgium, 13 francs, $1.00.

International postal exchanges with ten countries will be effected only through United States currency. The countries are: Bolivia, Chile, Costa Rica, Honduras, Hong Kong (China), Italy, Japan, Nicaragua, Salvador and Uruguay.

International money-orders are obtainable at any post-office in the countries listed above, as well as any post-office in the U.S.A. and Canada.

BRITISH-BUILT SHIP FOR AMERICA

With the ways of our shipyards gradually getting empty, it may come as a shock to read of the launching of a ship in England to the order of a New York firm. A fruit-carrying steamer was launched during January at Newcastle-on-Tyne to the order of the Atlantic Fruit Co. of New York. Comparison details with the Diesel-driven fruit-carrying motorship "Sevilla" of about similar size launched last month by Wood & Skinner, Newcastle-on-Tyne, to the order of Otto Thoresen of Norway would make most interesting reading. We are endeavoring to secure the same for publication.

AMERICA TO LEAD WORLD IN MOTORSHIP BUILDING

America is destined to assume leadership in the construction of motorships, it is predicted by Dr. Charles E. Lucke, professor of mechanical engineering at Columbia University, in an editorial on the relative merits of motor and steamships in the Journal of the American Society of Mechanical Engineers. Professor Lucke asserts the country is entering upon a program of motorship construction, and will eventually wrest leadership in that industry from the European countries in which it is at present most highly developed.

THE MOTORSHIP "FRITZOE"

In the description of the motorship "Fritzoe" on page 119 of our February issue the dimensions of the ship were given in feet and inches. This, of course, should have read metres and millimetres.

SIX 9,000-TON MOTORSHIPS UNDER CONSTRUCTION AT THE DEUTSCHE WERFT —OTHERS ON ORDER

In our January issue on page 31 we published the first official announcement that 24 Burmeister & Wain merchant-marine Diesel-engines aggregating 31,000 i.h.p. now under construction at the Berlin Works of the A. E. G. (General Electric Co.) for ships building at the Deutsche Werft, Hamburg.

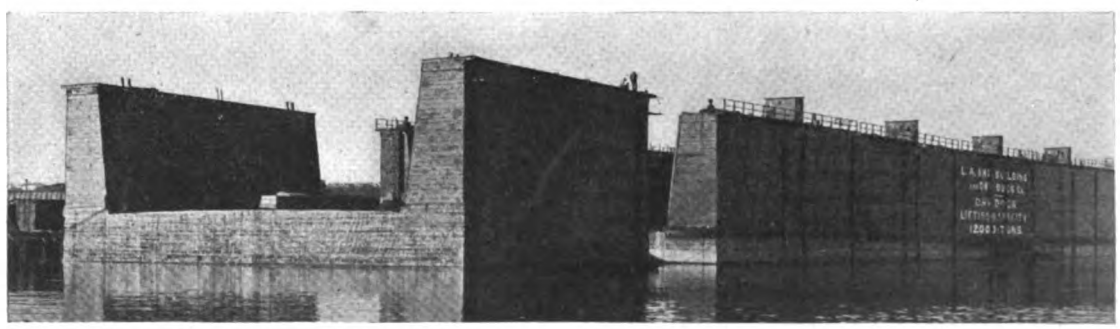
Six of the hulls are now on the stocks at this new yard which is entirely devoted to motorship building, having recently been founded by the Hamburg-American Line, the Güte Hoffnungshutte, the Allgemeinen Elektricitats-Gesellschaft, and the Deutsche Oelmaschinen-Gesellschaft.

These vessels are standardized twin-screw 9,000 tonners, built from fabricated steel supplied by the Güte Hoffnungshutte, while the Diesel-engines are built under B. & W. license by the A. E. G. Their dimensions will shortly be published in "Motorship," details now being en route to the United States. We understand that these motorships are being built to stock to the order of the Deutsche Werft A. V. who will place them on the market.

BIG DRY DOCK AT LOS ANGELES

When the Loss Angeles Shipbuilding and Dry Dock Company of Los Angeles, Cal., secured its site of about 70 acres of tide-flat land in Los Angeles harbor in 1917, it faced the problem of first creating solid-ground upon which to set its shops. To-day, the plant stands a hive of peace-time activity with a war record of thirty great steel freighters launched, four 11,600 ton steel vessels now on its ways, machine shops, copper, brass and wood working shops, one of the largest oxygen, acetylene, and hydrogen-gas generating plants on the entire west coast, and a floating dry-dock of 12,000 deadweight tons lifting capacity equal to the requirements of vessels of all sizes and classes from yachts to freighters, tankers and government craft. We are enabled to give an illustration of this fine dry dock.

Prior to several weeks ago this dock consisted only of five pontoons. The sixth pontoon is now added. The operation and control is electric and such that any number of units up to the entire six can be employed according to the size of the ship to be lifted.



The sixth pontoon being added to the other five of the Los Angeles Shipbuilding & Dry Dock Co., at Los Angeles harbor, making this the largest floating dry dock in Southern Pacific waters and capacity of handling ships up to 12,000 deadweight tons

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Our Readers' Opinions

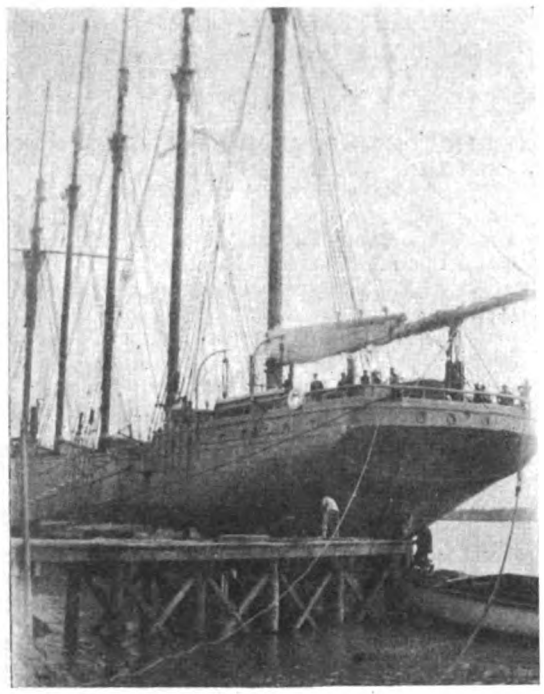
(The publication of letters does not necessarily imply Editorial endorsement of opinions expressed)

OVERHAULING THE M. A. "STASIA" IN CHINA

To the Editor of "Motorship."

Sir:—

Being an American Diesel marine-engineer and gas and oil-engine enthusiast, the arrival of the latest number of your magazine "Motorship" reminded me to send you the incidents surrounding the auxiliary-schooner "Stasia," built at Vancouver, B. C., and equipped with two 160 h.p. Bolinder oil-engines. You will recall that this wooden ship caught afire at Shanghai in Nov., 1918 and was sunk with a six-inch explosive shell by a British gunboat, the actual scene having been illustrated by you. The hole was patched by divers, and the ship raised by means of the ship's



Wooden Motor-schooner "Stasia" after overhauling following the cargo fire.

Worthington steam bilge-pump. The ship was dismantled and all useful material stored in warehouses. The engines were also dismantled and stored away.

In June, 1919, I undertook to rebuild the engines, and upon close examination found that the cylinders, heads, and one muffler were cracked and that most of the copper piping and brass parts had been melted by the fire. Also the port crankshaft was sprung ½ inch out of line.

Not wishing to re-machine the crank and thereby change the standard diameter if I straightened it hot, I accomplished the task by "peening" the web cold. As Chinese fitters are noted for their patience I had a true shaft in two weeks. The cylinders and heads were furnished by Mr. Eckman, Shop Supt. of the Kiangnan Dock of Shanghai, turning out a first-class job of good close-grained grey iron.

I had considerable difficulty making up the list of parts required, as my Bolinder catalogue does not include parts of the larger engines. So I was obliged to compare my requirements with the parts catalogue of the small engine. However, I succeeded and am very pleased to state that, although the cable was wired to Mr. Hy Lund, the Bolinder representative at San Francisco and rewired to Sweden, the parts arrived as ordered without error and adapted themselves to the engine without requiring machining or other fitting.

The engines started with the first "shot" of air, and after a few days I made an official test-run (dock trial) before the inspector of the Bureau Veritas. The ship was taken over by the owners a few days later and started for a trip to Marseilles.

The two French engineers who took the ship had seen service on French submarines and being accustomed to splash lubrication set the bearings too close, developing hot bearings. The ship put in at Shanghai for deck repairs and the engineer tried developing hot bearings. The ship put in at Shanghai for deck repeairs and the engineer tried to alter the oiling system but failed, so returned to the original system. Not having word to the contrary I presume that the ship proceeded on her trip to France. The engine-crew consists of Chief-engineer Begi and First-Assistant (both Frenchmen); two Chinese engineers, three-oilers and one donkey-man.

Yours very truly,

A. L. LESCHOT.

Tientsin, China.

PROPOSED MOTORSHIP-ENGINEERS' BUREAU

To the Editor of "Motorship":

Sir:

Would it not be a good plan for motorship-owners of the United States to have some kind of a Registry or Bureau devoted to engineers of that class of vessel. There have been complaints that there are not enough skilled oil-engine operators, or if men have been obtained they have not been competent.

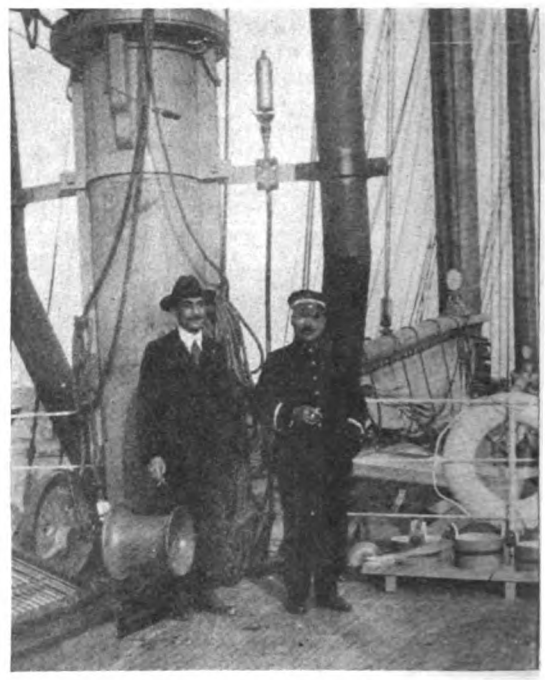
Now, in my duties as Chief-Engineer of motorships, I have been forced to take inexperienced men to make-up my staff, solely because I did not know where to get in touch with the available experienced men, although I knew at that time there were good men who were working in machine-shops because of not being able to find jobs on motorships and had given-up the sea for that reason. Whereas, the engineers of low-grade ability who cannot get work ashore have to scratch around and get another ship somehow.

In order to attract the class of man who is a good mechanic, and who takes a pride in his work and would be ashamed to have an outside shopman come aboard his ship to do any job that did not take machine-tools to do, you have to give a reasonable amount of study to employment systems. This could be accomplished by having a central Bureau of Registry where a motorship-engineer can either call or telegraph his application and receive notice of any positions vacant. It would also serve to clean the ships of "grafters," repair-sharks and "bluffers" who infest the internal-combustion engineers' ranks of to-day.

While working in a repair-shop I have been on jobs that have filled me with disgust and have been called upon to do things that should and would have been done on the ship without outside assistance if the engine-room force had been even in the "handy-man" class, thus saving the shipowners hundreds of dollars.

Now I believe that America in manning its ships should get men from the same place it obtains men for defence in case of war, and also the same kind of "Americans" by having a place of this kind where their records could be kept. Then we would get a class of men that could not be bettered.

I have been to sea twenty-two years and have operated engines burning gasoline, kerosene and producer-gas, also hot-bulb and Diesel oil-engines, and I fail to see any substantial reason why some engines of the same design can make voyages of thousands of miles without repairs, while others of the same make have to go into port every three or four hundred miles for break-downs. I will admit that some installations have been made where economy has been the main feature, resulting in poor layout, and also ignorance has played a great part. But, unreliable results are usually due to the crew. I have been on two ships where I have had to line-up the motors each time we were loaded and discharged; but that is what an engineer is there for.



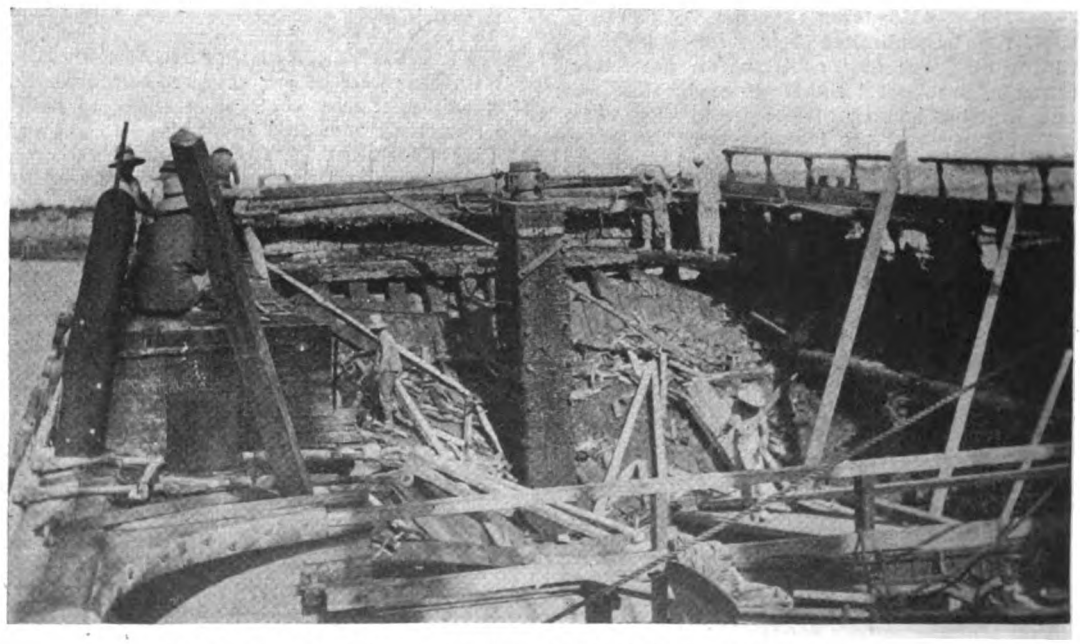
On the left, Mr. A. L. Leschot, who reconstructed the auxiliary "Stasia." On the right, Chief-Engineer Begi.

This proposed Central Bureau could also be used to compare the performances of the different motorships by filing abstracts of runs by both captains and engineers, in order that the development of the motorship could be checked-up as a whole, and advice given in monthly reports as to different types of engines, deck-machinery; fuel-oils, lubricating-oils, etc. Faults that are bound to occur in any new development thus may be reduced to a minimum. Last of all, let us remember that the United States has never started anything that it couldn't finish and come out at the top of the heap. If motorship owners and crews work together I can see nothing but success and prosperity in sight.

SHIP'S ENGINEER.

New York, Feb. 11, 1921.

[We have been obliged to hold over a number of letters.—*Editor.*]



Engine-room of the motor-schooner "Stasia" after the cargo fire.

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